Question #1 of 78

Suppose that the value of an option-free bond is equal to 100.16, the value of the corresponding callable bond is equal to 99.42, and the value of the corresponding putable bond is 101.72. What is the value of the call option?

A) 0.74. ✓

B) 0.64. ✗

C) 0.21. ✗

Explanation

The call option value is just the difference between the value of the option-free bond and the value of the callable bond. Therefore, we have:

Call option value = 100.16 – 99.42 = 0.74.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #2 of 78

How do the risk-return characteristics of a newly issued convertible bond compare with the risk-return characteristics of ownership of the underlying common stock? The convertible bond has:

A) higher risk and higher return potential. ✗

B) lower risk and higher return potential. ✗

C) lower risk and lower return potential. ✓

Explanation

Buying convertible bonds in lieu of direct stock investing limits downside risk due to the price floor set by the straight bond value. The cost of the risk protection is the reduced upside potential due to the conversion premium.

(Study Session 13, Module 36.8, LOS 36.q)

Related Material

SchweserNotes - Book 4

Question #3 of 78

The effective convexity of a bond is most likely to be negative if the bond is:

A) callable.

B) putable.

C) option-free.

Explanation

The effective convexity of a callable bond be negative (meaning that the upside for the callable bond is smaller than the downside) when the call option is near the money. Option-free bonds exhibit positive convexity, meaning that the price rises more when interest rates fall than the bond price declines when interest rates rise by the same amount. The convexity of putable bonds is always positive.

(Study Session 13, Module 36.6, LOS 36.l)

Related Material

SchweserNotes - Book 4

Question #4 of 78

What is the market conversion price of a convertible security?

A) The price that an investor pays for the common stock if the convertible bond is purchased and then converted into the stock.

B) The price that an investor pays for the common stock in the market.

C) The value of the security if it is converted immediately.

Explanation

The market conversion price, or conversion parity price, is the price that the convertible bondholder would effectively pay for the stock if she bought the bond and immediately converted it.

market conversion price = market price of convertible bond ÷ conversion ratio.

(Study Session 13, Module 36.8, LOS 36.o)

Related Material

SchweserNotes - Book 4

Question #5 of 78

Joseph Dentice, CFA is evaluating three bonds. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable at any time at par and bond C is putable at any time at par. Yield curve is currently flat at 3%.

The bond with the lowest one-sided down-duration is *most likely* to be:

A) Bond B. ✓

B) Bond A. ✗

C) Bond C. ✗

Explanation

When the underlying option is at (or near) money, callable bonds will have lower one-sided down-duration than one-sided up-duration; the price change of a callable when rates fall is smaller than the price change for an equal increase in rates. In this problem, the coupon rate is given to be equal to the current level of rates and hence the bond should be at par and the underlying option is at-the-money.

(Study Session 13, Module 36.6, LOS 36.k)

Related Material

SchweserNotes - Book 4

Question #6 of 78

MediSoft Inc. develops and distributes high-tech medical software used in hospitals and clinics across the United States and Canada. The firm's software provides an integrated solution to monitoring, analyzing, and managing output from a variety of diagnostic medical equipment including MRIs, CT scans, and EKG machines. MediSoft has grown rapidly since its inception ten years ago, averaging 25% growth in sales over the past decade. The company went public three years ago. Twelve months after its IPO, MediSoft made two semiannual coupon bond offerings, the first of which was a convertible bond. At the time of issuance, the convertible bond had a coupon rate of 7.25%, a par value of $1,000, a conversion price of $55.56, and ten years until maturity. Two years after issuance, the bond became callable at 102% of par value. Soon after the issuance of the convertible bond, the company issued another series of bonds, which were putable but contained no conversion or call features. The putable bonds were issued with a coupon of 8.0%, a par value of $1,000, and 15 years until maturity. One year after their issuance, the put feature of the putable bonds became active, allowing the bonds to be put at a price of 95% of par value, and increasing linearly over five yea rs to 100% of par value. MediSoft's convertible bonds are now trading in the market for a price of $947 with an estimated straight value of $917. The company's putable bonds are trading at a price of $1,052. Volatility in the price of MediSoft's common stock has been relatively high over the past few months. Currently, the stock is priced at $50 on the New York Stock Exchange and is expected to continue its annual dividend in the amount of $1.80 per share.

High-tech industry analysts for Brown & Associates, a money management firm specializing in fixed-income investments, have been closely following MediSoft ever since it went public three years ago. In general, portfolio managers at Brown & Associates do not participate in initial offerings of debt investments, preferring instead to see how the issue trades before considering taking a position in the issue. Because MediSoft's bonds have had ample time to trade in the marketplace, analysts and portfolio managers have taken an interest in the company's bonds. At a meeting to discuss the merits of MediSoft's bonds, the following comments were made by various portfolio managers and analysts at Brown & Associates:

> "Choosing to invest in MediSoft's convertible bond would benefit our portfolios in many ways, but the primary benefit is the limited downside risk associated with the bond. Because the straight value will provide a floor for the value of the convertible bond, downside risk is limited to the difference between the market price of the bond and the straight value."
>
> "Decreasing volatility in the price of MediSoft's common stock as well as increasing volatility in the level of interest rates are expected in the near future. The combined effects of these changes in volatility will be a decrease in the price of MediSoft's putable bonds and an increase in the price of the convertible bonds. Therefore, only the convertible bonds would be a suitable purchase."

Assuming the common stock of MediSoft underwent a one-for-two reverse split, how would the features of the company's bonds be adjusted? The:

A) conversion ratio of the convertible bond would be reduced by 50%. ✓

B) market conversion price of the convertible bond would be reduced by half. ✗

C) conversion value of the convertible bond would be reduced by half. ✗

Explanation

A stock split would affect the market price of the common stock and the conversion ratio of a convertible bond. Since the split is a one-for-two split, the number of shares outstanding in the marketplace will be reduced by one half. Therefore, the stock price will double, keeping the total market value of the stock the same. Upon a stock split (or a reverse stock split), the conversion ratio is adjusted to reflect the split. In this case, the conversion ratio would be reduced by half. The market conversion price would double (the price of the bond is unchanged, but the conversion ratio decreases by 50%).

(Study Session 13, Module 36.8, LOS 36.o)

Related Material

SchweserNotes - Book 4

Question #7 of 78

Sharon Rogner, CFA is evaluating three bonds for inclusion in fixed income portfolio for one of her pension fund clients. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years. Rogner computes the OAS of bond A to be 50bps using a binomial tree with an assumed interest rate volatility of 15%.

If Rogner revises her estimate of interest rate volatility to 20%, the computed OAS of Bond B would *most likely* be:

A) higher than 50bps. ✗

B) lower than 50bps. ✓

C) equal to 50bps. ✗

Explanation

The OAS of the three bonds should be same as they are given to be identical bonds except for the embedded options (OAS is after removing the option feature and hence would not be affected by embedded options). Hence the OAS of bond B would be 50 bps absent any changes in assumed level of volatility.

When the assumed level of volatility in the tree is increased, the value of the embedded call option would increase and the *computed* value of the callable bond would decrease. The constant spread now needed to force the computed value to be equal to the market price is therefore lower than before. Hence an increase in volatility estimate reduces the computed OAS for a callable bond.

(Study Session 13, Module 36.4, LOS 36.h)

Related Material

SchweserNotes - Book 4

Question #8 of 78

Joseph Dentice, CFA is evaluating three bonds. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable at any time at par and bond C is putable at any time at par. Yield curve is currently flat at 3%.

The bond *least likely* to have the highest one-sided down-duration is:

A) Bond B. ✓

B) Bond C. ✗

C) Bond A. ✗

Explanation

When the underlying option is at (or near) money, callable bonds will have lower one-sided down-duration than one-sided up-duration; the price change of a callable when rates fall is smaller than the price change for an equal increase in rates. In this problem, the coupon rate is given to be equal to the current level of rates and hence the bond should be at par and the underlying option is at-the-money.

(Study Session 13, Module 36.6, LOS 36.k)

Related Material

SchweserNotes - Book 4

Question #9 of 78

For a callable bond, the value of an embedded option is the price of the option-free bond:

A) plus the risk-free rate. ✗

B) plus the price of a callable bond of the same maturity, coupon and rating. ✗

C) minus the price of a callable bond of the same maturity, coupon and rating.

Explanation

The value of the option embedded in a bond is the difference between that bond and an option-free bond of the same maturity, coupon and rating. The callable bond will have a price that is less than the price of a non-callable bond. Thus, the value of the embedded option is the option-free bond's price minus the callable bond's price.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #10 of 78

Suppose that the stock price of a common stock increases by 10%. Which of the following is *most* accurate for the price of the recently issued convertible bond? The value of the convertible bond will:

A) increase by less than 10%.

B) remain unchanged.

C) increase by 10%.

Explanation

When the underlying stock price rises, the convertible bond will underperform because of the conversion premium. However, buying convertible bonds in lieu of stocks limits downside risk. The price floor set by the straight bond value causes this downside protection.

(Study Session 13, Module 36.8, LOS 36.q)

Related Material

SchweserNotes - Book 4

Question #11 of 78

Which of the following statements is *most* accurate concerning a convertible bond? A convertible bond's value depends:

A) on both interest rate changes and changes in the market price of the stock.

B) only on interest rate changes.

C) only on changes in the market price of the stock.

Explanation

The value of convertible bond includes the value of a straight bond plus an option giving the bondholder the right to buy the common stock of the issuer. Hence, interest rates affect the bond value and the underlying stock price affects the option value.

(Study Session 13, Module 36, LOS 36.n)

Related Material

SchweserNotes - Book 4

Question #12 of 78

Kylie Autumn, CFA, is a consultant with Tri-Vision Group. Robert Lullum, Senior Vice President at Langsford Investments, has asked for assistance with the evaluation of mortgage-backed and collateralized mortgage obligation (CMO) derivative securities for potential inclusion in several client portfolios. Langsford Investments mainly deals with equity investments and REITs, but the company recently purchased a small firm that invests mainly in fixed-income securities.

Lullum has done some research on the appropriate spread measures and option valuation models for fixed-income securities and wants to clarify some points. He wants to know if the following statements are correct:

Statement 1:	The proper spread measure for option-free corporate bonds is the nominal spread.
Statement 2:	Callable corporate bonds and mortgage-backed securities should be measured using the option-added spread.
Statement 3:	The Z-spread is appropriate for credit card ABS and auto loan ABS.

While Lullum meets with Autumn, Janet Van Ark, CFA charterholder and equity income portfolio manager for Langsford, is attempting to purchase bonds that may also provide her with equity exposure in the future. She has decided to analyze an 8% annual coupon bond with exactly 20 years to maturity. The bonds are convertible into 10 common shares for each $1,000 of par (face) value. The bond's market price is $920, and the common stock has a market price of $40. VanArk estimates that the stock will increase in value to $70 within the next two years. The stock's annual dividend is $0.40 per share, and the market yield on comparable non-convertible bonds is 9.5%.

Carl Leighton, a Langsford analyst and Level II CFA candidate, works with mortgage-backed and other asset-based securities. He provides Lullum with a list of credit enhancements for asset-backed securities, which includes letters of credit, excess servicing spread funds, overcollateralization, and bond insurance. Lullum then asks him for a status report of the firm's exposure to paythrough securities. He also asks Leighton to calculate the single-monthly mortality rate (SMM) and estimate the prepayment for the month for a seasoned mortgage pool with a $500,000 principal balance remaining. The scheduled monthly principal payment is $150 and the conditional prepayment rate (CPR) is 7%.

How many of the three statements on appropriate spread measures and valuation models are correct?

A) None of the three statements are correct. ✗

B) Only one statement is correct. ✓

C) Only two statements are correct. ✗

Explanation

Statement 1 is incorrect. The *Z*-spread is the appropriate spread measure for option-free corporate bonds. Statement 2 is also incorrect, as it should say option-adjusted spread or "option-removed spread." Statement 3 is correct.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #13 of 78

Which of the following scenarios will lead to a convertible bond underperforming the underlying stock?

The:

A) stock price rises.

B) stock price falls.

C) stock price is stable.

Explanation

A convertible bond underperforms the underlying common stock when that stock increases in value. This is because of the conversion premium which means that the bond will increase less than the increase in stock price. If the stock price falls, the convertible bond should outperform the stock because of the floor created by the straight-value. If the stock is stable, the bond is likely to outperform the stock because of the higher current yield of the bond. If the bond is upgraded, the bond should increase in value. There is no reason that upgrading the bond should lead to the bond underperforming the stock.

(Study Session 13, Module 36.8, LOS 36.q)

Related Material

SchweserNotes - Book 4

Question #14 of 78

Kylie Autumn, CFA, is a consultant with Tri-Vision Group. Robert Lullum, Senior Vice President at Langsford Investments, has asked for assistance with the evaluation of mortgage-backed and collateralized mortgage obligation (CMO) derivative securities for potential inclusion in several client portfolios. Langsford Investments mainly deals with equity investments and REITs, but the company recently purchased a small firm that invests mainly in fixed-income securities.

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Autumn should tell Lullum that the *most appropriate* models for valuing the option on mortgage-backed securities (MBS) and credit card asset-backed securities (ABS) are:

A) Monte Carlo for the MBS. No model is needed for the ABS. ✓

B) Monte Carlo or binomial for the MBS, but binomial only for the ABS. ✗

C) Monte Carlo for both the MBS and the ABS. ✗

Explanation

Since MBS have an embedded option (prepayment option) that is typically exercised and is path dependent, the appropriate valuation model is Monte Carlo simulation. Credit card ABS do not have an embedded option, so neither valuation model is needed. A simple discounted cash flow model is sufficient.

(Study Session 13, Module 36.2, LOS 36.c)

Related Material

SchweserNotes - Book 4

Question #15 of 78

MediSoft Inc. develops and distributes high-tech medical software used in hospitals and clinics across the United States and Canada. The firm's software provides an integrated solution to monitoring, analyzing, and managing output from a variety of diagnostic medical equipment including MRIs, CT scans, and EKG machines. MediSoft has grown rapidly since its inception ten years ago, averaging 25% growth in sales over the past decade. The company went public three years ago. Twelve months after its IPO, MediSoft made two semiannual coupon bond offerings, the first of which was a convertible bond. At the time of issuance, the convertible bond had a coupon rate of 7.25%, a par value of $1,000, a conversion price of $55.56, and ten years until maturity. Two years after issuance, the bond became callable at 102% of par value. Soon after the issuance of the convertible bond, the company issued another series of bonds, which were putable but contained no conversion or call features. The putable bonds were issued with a coupon of 8.0%, a par value of $1,000, and 15 years until maturity. One year after their issuance, the put feature of the putable bonds became active, allowing the bonds to be put at a price of 95% of par value, and increasing linearly over five yea rs to 100% of par value. MediSoft's convertible bonds are now trading in the market for a price of $947 with an estimated straight value of $917. The company's putable bonds are trading at a price of $1,052. Volatility in the price of MediSoft's common stock has been relatively high over the past few months. Currently, the stock is priced at $50 on the New York Stock Exchange and is expected to continue its annual dividend in the amount of $1.80 per share.

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> "Choosing to invest in MediSoft's convertible bond would benefit our portfolios in many ways, but the primary benefit is the limited downside risk associated with the bond. Because the straight value will provide a floor for the value of the convertible bond, downside risk is limited to the difference between the market price of the bond and the straight value."
>
> "Decreasing volatility in the price of MediSoft's common stock as well as increasing volatility in the level of interest rates are expected in the near future. The combined effects of these changes in volatility will be a decrease in the price of MediSoft's putable bonds and an increase in the price of the convertible bonds. Therefore, only the convertible bonds would be a suitable purchase."

Subsequent to purchasing one of the putable bonds for his portfolio, one of the managers at Brown & Associates realized that the bond contained a soft put. Which of the following securities cannot be used to redeem the bond in the event the bond becomes putable?

A) Shares of MediSoft's common stock.

B) MediSoft's 9.0% subordinated notes with a maturity of 10 years.

C) Thirty-year Treasury notes with a coupon of 4.5%.

Explanation

A bond with an embedded soft put is redeemable through the issuance of cash, subordinated notes, common stock, or any combination of these three securities. In contrast, a bond with a hard put is only redeemable using cash.

(Study Session 13, Module 36.1, LOS 36.a)

Related Material

SchweserNotes - Book 4

Question #16 of 78

Mary Pierce, CFA, has just joined The James Group as a fixed income security analyst. Pierce has taken over for Katy Williams, who left The James Group to start her own investment firm. Pierce has been reviewing Williams's files, which include data on a number of securities that Williams had been reviewing.

The first file had information on several different asset-backed securities. A summary schedule that Williams had prepared is shown in Exhibit 1.

Exhibit 1: Summary Schedule

ecurity	Rating	Nominal Spread (bp)
GG Auto Loans	AA	124
KK Auto Loans	AA	118
CC Credit Card Receivables	AA	136
HH Home Equity Loans	AA	168
LL Home Equity Loans	AA	174

The second file included the following schedule of information relating to a specific CMO that Williams had been considering. Exhibit 2 reflects the results of a Monte Carlo simulation based on 15% volatility of interest rates. This security is still available, and Pierce needs to evaluate the investment merit of any or all of the listed tranches.

Exhibit 2: Monte Carlo Simulation Based on 15% Interest Rate Volatility

Tranche	Par Amount ($ million)	OAS (bp)	Z-Spread (bp)	Effective Duration (years)
PAC A	75.0	40	40	1.5
PAC B	40.0	43	95	4.2
PAC C	25.0	65	117	5.0
PAC D	50.0	72	140	7.9
Support S	100.0	51	142	11.8

A third file contained notes Williams had taken at a seminar a couple of months ago on valuing various types of asset-backed and mortgage-backed securities. These notes included the following comments that Pierce found interesting:

> "Cash flow yield (CFY) is one method of valuing mortgage-backed securities. An advantage of the CFY is that it does not rely on any specific prepayment assumptions. An important weakness of CFY is the assumption that interim cash flows will be reinvested at the CFY. This is rarely true for mortgage-backed securities."

"Cash flow duration is similar to effective duration, but its weakness is that it fails to fully account for changes in prepayment rates as cash flow yields change. Empirical duration suffers two disadvantages as a measure of interest rate exposure: reliance on theoretical formulas and reliance on historical pricing data that may not exist for many mortgage-backed securities."

"The recent increase in the default rate for subprime adjustable rate mortgages can be traced to the structure of these loans. The negative amortization feature of these loans basically gave the borrower an at-the-money call option on their property. Once the property decreased in value, this call option was worthless, and the borrower had no incentive to make any additional payments."

The OAS in Exhibit 2 *most likely* reflect:

A) average spreads over the Treasury yield curve. ✗

B) simple spreads over the Treasury yield curve. ✗

C) average spreads over the Treasury spot rate curve. ✓

Explanation

OAS is interpreted as the average spread over the Treasury *spot rate* curve. The *nominal spread* is measured relative to the Treasury *yield* curve.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #17 of 78

Sharon Rogner, CFA is evaluating three bonds for inclusion in fixed income portfolio for one of her pension fund clients. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years. Rogner computes the OAS of bond A to be 50bps using a binomial tree with an assumed interest rate volatility of 15%.

If Rogner revises her estimate of interest rate volatility to 10%, the computed OAS of Bond B would *most likely* be:

A) lower than 50bps. ✗

B) higher than 50bps. ✓

C) equal to 50bps. ✗

Explanation

The OAS of the three bonds should be same as they are given to be identical bonds except for the embedded options (OAS is after removing the option feature and hence would not be affected by embedded options). Hence the OAS of bond B would be 50 bps absent any changes in assumed level of volatility.

When the assumed level of volatility in the tree is decreased, the value of the call option would decrease and the *computed* value of the callable bond would increase. The constant spread now needed to force the computed value to be equal to the market price is therefore higher than before. Hence a decrease in the volatility estimate increases the computed OAS for a callable bond.

(Study Session 13, Module 36.4, LOS 36.h)

Related Material

SchweserNotes - Book 4

Question #18 of 78

Christopher Robinson, chairman of the board of directors for a private endowment fund, believes that the endowment fund for which he is responsible has diverged too far from its stated objectives. Over several years, the board has increased the size of the fund's equity position beyond the stated limits of the investment policy statement. In an effort to realign the fund's investments, Robinson has elected to choose a mortgage-backed security (MBS) for inclusion in the endowment's portfolio. After surveying the MBS market, Robinson has selected four MBS securities to present as potential investments at the next investment committee meeting. Details on the selected MBS securities are presented below:

MBS	Initial Principal ($millions)	Coupon Rate	Underlying Maturity (years)	Nominal Spread	OAS	Z-spread
W	250	7.0%	30	1.21%	0.28%	0.79%
X	175	7.8%	25	1.43%	0.49%	1.16%
Y	225	7.2%	20	1.62%	0.31%	1.12%
Z	190	8.0%	30	1.59%	0.40%	1.14%

At the investment committee meeting, a fellow board member raises his concerns over the potential MBS investments stating, "While we all agree that the fixed-income proportion of the endowment is much too small, I am not sure the suggested MBS securities will fulfill the cash flow requirements of the endowment. What risks are we taking on by allocating a portion of the portfolio to these investments? We cannot afford to end up with a timing mismatch between the cash needs of the endowment and the cash provided from its investments. Also, we have given no consideration to commercial mortgage-backed securities (CMBS). Isn't our analysis incomplete if we fail to give proper discussion of potential CMBS investment opportunities?"

Robinson responded to his fellow board member by addressing the board member's concerns as follows:

> "Because the cash requirements of the endowment fund fluctuate directly with interest rates, the cash flows provided from the MBS will provide adequate protection against cash shortfalls arising from differences in the timing of cash needs and cash sources. In addition, we can further reduce uncertainty surrounding the timing of cash flows by purchasing planned amortization class CMOs, which are securities issued against pools of MBS. CMBS were not presented due to the unacceptable risk profile of the comparable CMBS trading in the marketplace."

Of the four MBS securities under consideration, which MBS will add the *most* value relative to the risk associated with the security assuming the effective durations of the MBS securities is approximately the same?

A) MBS-Y.

B) MBS-W.

C) MBS-X.

Explanation

MBS-X has the highest OAS relative to the cost of the option embedded in the MBS. Therefore, it is the most attractive of the four alternatives.

(Study Session 13, Module 36.4, LOS 36.g)

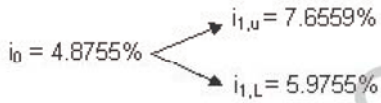
Related Material

SchweserNotes - Book 4

Eric Rome works in the back office at Finance Solutions, a limited liability firm that specializes in designing basic and sophisticated financial securities. Most of their clients are commercial and investment banks, and the detection, and control of interest rate risk is Financial Solution's competitive advantage.

One of their clients is looking to design a fairly straightforward security: a callable bond. The bond pays interest annually over a two-year life, has a 7% coupon payment, and has a par value of $100. The bond is callable in one year at par ($100).

Rome uses a binomial tree approach to value the callable bond. He's already determined, using a similar approach, that the value of the option-free counterpart is $102.196. This price came from discounting cash flows at on-the-run rates for the issuer. Those discount rates are given below:



Rome is also interested in the 2027 6% convertible bond of Stellar Inc. The bond can be converted into 25 shares of common stock and is trading at $1024. Stellar's current stock price is $32. Comparable nonconvertible bonds currently yield 6%.

Question #19 of 78

Using the binomial tree model, what is the value of the callable bond?

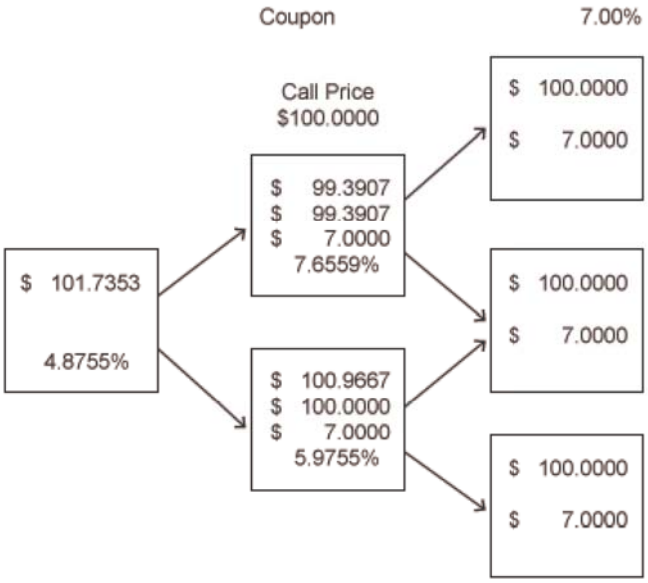
A) $101.735.

B) $95.521.

C) $102.196.

Explanation

The value of this bond at node 0 is $V_0 = ½ \times [(\$99.391 + \$7) \div 1.048755 + (\$100.000 + \$7) \div 1.048755] = \$101.735$, so the price of the callable bond is \$101.735.



(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #20 of 78

What is the value of the call option embedded in this bond?

A) \$0.461. ✓

B) \$6.675. ✗

C) \$12.924. ✗

Explanation

Given in the problem is the value of the bond's option-free counterpart: \$102.196. From Part A we've determined the price of the callable bond to be \$101.735. From the relationship:

$V_{call} = V_{option\text{-}free} - V_{callable}$

We can determine that the value of the call option is \$102.196 – \$101.735 = \$0.461.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #21 of 78

If the bond is putable in one year at par, the value of the put is *closest* to:

A) $12.487.

B) $0.461.

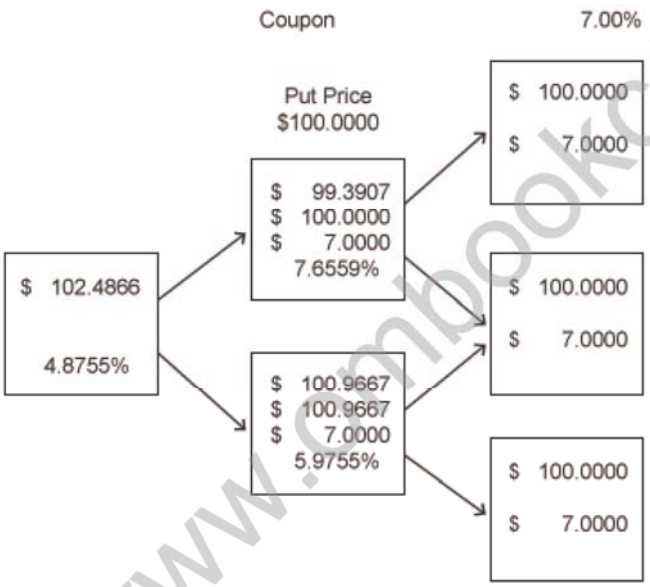
C) $0.291.

Explanation

The value of the bond's option-free counterpart is $102.196 (given). We can calculate the price of the putable bond to be $102.487. From the relationship:

$V_{put} = V_{putable} - V_{option\text{-}free}$

We can determine that the value of the put option is $102.487 – $102.196 = $0.291.



(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #22 of 78

Which of the following steps that Rome might go through in calculating the effective duration of this callable bond is *least accurate*?

A) Given the assumptions about benchmark interest rates, interest rate volatility, and a call and/or put rule, calculate the OAS for the issue, using the binomial model.

B) Add the zero-volatility spread to each of the 1-year forward rates in the interest rate tree to get a "modified" tree.

C) Impose a small parallel shift to the interest rates used in the problem by an amount equal to $+\Delta$.

Explanation

Calculating effective duration for bonds with embedded options is a complicated undertaking because you must calculate values of V_+ and V_-. Given the information in the problem, this requires following seven steps:

Step 1: Given the assumptions about benchmark interest rates, interest rate volatility, and a call and/or put rule, calculate the OAS for the issue, using the binomial model.

Step 2: Impose a small parallel shift to the interest rates used in the problem by an amount equal to $+D_i$.

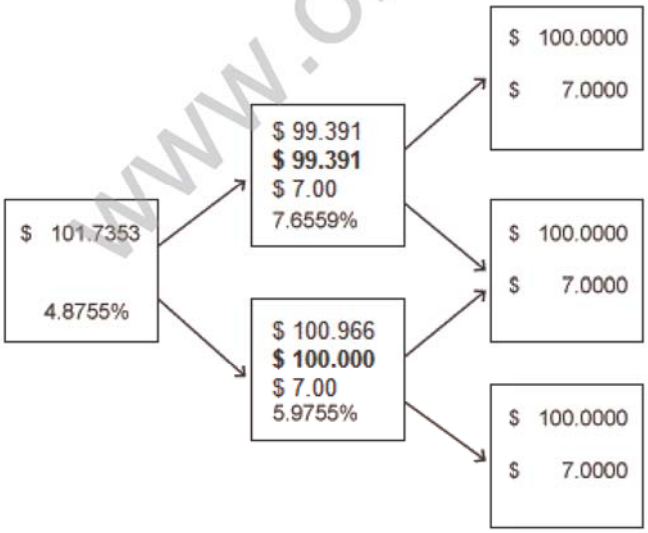
Step 3: Build a new binomial tree using the new yield curve.

Step 4: Add the OAS to each of the 1-year **forward** rates in the interest rate tree to get a "modified" tree. (We assume that the OAS does not change when the interest rates change.)

Step 5: Compute the new value for V_+ using this modified interest rate tree.

Step 6: Repeat steps 2 through 5 using a parallel shift of $-D_I$ to obtain the value for V_- .

Step 7: Use the formula duration = $(V_- + V_+) / 2V_0(DI)$.



(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #23 of 78

If Rome revises his estimate of interest rate volatility used in generation of the interest rate tree upwards, the price of callable bond would *most likely*:

A) Increase.

B) Remain unchanged.

C) Fall.

Explanation

An increase in interest rate volatility would increase the value of the call option leaving the value of option-free bond unchanged. This would lead to a decrease in the price of the callable bond.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #24 of 78

The market conversion premium ratio for Stellar's convertible bond is *closest* to:

A) 28%.

B) 2.40%

C) 20.6%.

Explanation

An investor who purchases the convertible bond rather than the underlying stock will pay a premium over the current market price of the stock. This market conversion premium per share is equal to the difference between the market conversion price and the current market price of the stock.

Market conversion price = market price of CB ÷ conversion ratio = 1024 / 25 = 40.96

Market conversion premium = conversion price − market price = 40.96 − 32 = 8.96

$$\text{Market conversion premium ratio} = \frac{\text{market conversion premium per share}}{\text{market price of common stock}} = \frac{8.96}{32} = 28\%$$

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #25 of 78

Natalia Berg, CFA, has estimated the key rate durations for several maturities in three of her $25 million bond portfolios, as shown in Exhibit 1.

Exhibit 1: Key Rate Durations for Three Fixed-Income Portfolios

Key Rate Maturity	Portfolio 1	Portfolio 2	Portfolio 3
2-year	2.45	0.35	1.26
5-year	0.20	0.40	1.27
10-year	0.15	4.00	1.23
20-year	2.20	0.25	1.24
Total	5.00	5.00	5.00

At a fixed-income conference in London, Berg hears a presentation by a university professor on the increasing use of the swap rate curve as a benchmark instead of the government bond yield curve. When Berg returns from the conference, she realizes she has left her notes from the presentation on the airplane. However, she is very interested in learning more about whether she should consider using the swap rate curve in her work.

As she tries to reconstruct what was said at the conference, she writes down two advantages to using the swap rate curve:

Statement 1:	The swap rate curve typically has yield quotes at 11 maturities between 2 and 30 years. The U.S. government bond yield curve, however, has fewer on-the-run issues trading at maturities of at least two years.
Statement 2:	Swap curves across countries are more comparable than government bond curves because they reflect similar levels of credit risk.

Berg also estimates the nominal spread, Z-spread, and option-adjusted spread (OAS) for the Steigers Corporation callable bonds in Portfolio 2. The OAS is estimated from a binomial interest rate tree. The results are shown in Exhibit 2.

Exhibit 2: Spread Measures for Steigers Corporation Callable Bonds

	Spread Measure	Benchmark
Nominal spread	25 basis points	Steigers Corp yield curve
Z-spread	35 basis points	Steigers Corp spot rate curve
OAS	−20 basis points	Steigers Corp spot rate curve
Nominal spread	120 basis points	Treasury yield curve
OAS	40 basis points	Treasury spot rate curve

Berg determines that to obtain an accurate estimate of the effective duration and effective convexity of a callable bond using a binomial model, the specified change in yield (i.e., Δy) must be equal to the OAS.

Berg also observes that the current Treasury bond yield curve is upward sloping. Based on this observation, Berg forecasts that short-term interest rates will increase.

Is Berg correct about the specified change in yield needed to obtain an accurate estimate of the effective duration and effective convexity of a callable bond using a binomial model?

A) No, because the specified change in yield must be larger than the option-adjusted spread (OAS).

B) No, because the specified change in yield can be larger than, smaller than, or equal to the OAS.

C) No, because the specified change in yield must be smaller than the OAS.

Explanation

The steps in the process of calculating the effective duration of a callable bond using a binomial tree are as follows:

Step 1:	Given assumptions about benchmark interest rates, interest rate volatility, and the call and/or put rule, calculate the OAS for the issue using the binomial model.
Step 2:	Impose a small parallel shift in the on-the-run yield curve by an amount equal to $+\Delta y$.
Step 3:	Build a new binomial interest rate tree using the new yield curve.
Step 4:	Add the OAS to each of the 1-year forward rates in the interest rate tree to get a "modified" tree. (We assume that the OAS does not change when interest rates change.)
Step 5:	Compute $BV_{+\Delta y}$ using this modified interest rate tree.
Step 6:	Repeat steps 2 through 5 using a parallel rate shift of $-\Delta y$ to estimate a value of $BV_{-\Delta y}$.

There is no restriction on the relationship between the assumed change in the yield (Δy) and the OAS.

(Study Session 13, Module 36.5, LOS 36.i)

Related Material

SchweserNotes - Book 4

Question #26 of 78

Bill Moxley, CFA is evaluating three bonds for inclusion in fixed income portfolio for one of his pension fund clients. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years. The yield curve is currently flat.

If the yield curve is expected to have a parallel downward shift, the bond with the highest price appreciation is *least likely* to be:

A) Bond C ✗

B) Bond A ✗

C) Bond B ✓

Explanation

Bond B has an embedded call option which limits its upside resulting in negative convexity. Bonds A and C do not have such limits.

(Study Session 13, Module 36.3, LOS 36.e)

Related Material

SchweserNotes - Book 4

Question #27 of 78

How does the value of a callable bond compare to a noncallable bond? The bond value is:

A) lower or higher. ✗

B) higher. ✗

C) lower. ✓

Explanation

Since the issuer has the option to call the bonds before maturity, he is able to call the bonds when their coupon rate is high relative to the market interest rate and obtain cheaper financing through a new bond issue. This, however, is not in the interest of the bond holders who would like to continue receiving the high coupon rates. Therefore, they will only pay a lower price for callable bonds.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #28 of 78

Which of the following is the appropriate "nodal decision" within the backward induction methodology of the interest tree framework for a putable bond?

A) Max(put price, discounted value).

B) Min(put value, discounted value).

C) Max(par value, discounted value).

Explanation

When valuing a putable bond using the backward induction methodology, the relevant cash flow to use at each nodal period is the coupon to be received during that nodal period plus the computed value or exercise price, whichever is greater.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #29 of 78

A callable bond, a putable bond, and an option-free bond have the same coupon, maturity and rating. The call price and put price are 98 and 102 respectively. The option-free bond trades at par. Which of the following lists *correctly* orders the values of the three bonds from lowest to highest?

A) Callable bond, option-free bond, putable bond.

B) Option-free bond, putable bond, callable bond.

C) Putable bond, option-free bond, callable bond.

Explanation

The put feature increases the value of a bond and the call feature lowers the value of a bond, when all other things are equal. Thus, the putable bond generally trades higher than a corresponding option-free bond, and the callable bond trades at a lower price.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #30 of 78

How is the value of the embedded call option of a callable bond determined? The value of the embedded call option is:

A) determined using the standard Black-Scholes model.

B) equal to the amount by which the callable bond value exceeds the option-free bond value.

C) the difference between the value of the option-free bond and the callable bond.

Explanation

The callable bond is equivalent to the option-free bond except that the issuer has the option to call the bond at the call price before maturity. Therefore, for the holder of the bond, the bond is worth the same as the option-free bond reduced by the value of the option.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #31 of 78

For a putable bond, callable bond, or putable/callable bond, the nodal-decision process within the backward induction methodology of the interest rate tree framework requires that at each node the possible values will:

A) include the face value of the bond.

B) not be higher than the call price or lower than the put price.

C) be, in number, two plus the number of embedded options.

Explanation

At each node, there will only be two values. At each node, the analyst must determine if the initially calculated values will be below the put price or above the call price. If a calculated value falls below the put price: $V_{i,U}$ = the put price. Likewise, if a calculated value falls above the call price, then $V_{i,L}$ = the call price. Thus the put and call price are lower and upper limits, respectively, of the bond's value at a node.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #32 of 78

The value of a convertible bond is most likely to be calculated as the value of an equivalent straight bond:

A) plus the value of a call option on the stock. ✓

B) plus the value of a call option on the bond. ✗

C) minus the value of a put option on the bond. ✗

Explanation

A traditional convertible bond can be viewed as a straight bond plus a call option on the issuer's common stock. The value of a convertible bond would be increased by an investor put option, and decreased by an issuer call option.

(Study Session 13, Module 36.8, LOS 36.p)

Related Material

SchweserNotes - Book 4

Question #33 of 78

Sharon Rogner, CFA is evaluating three bonds for inclusion in fixed income portfolio for one of her pension fund clients. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years. Rogner computes the OAS of bond A to be 50bps using a binomial tree with an assumed interest rate volatility of 15%.

If Rogner revises her estimate of interest rate volatility to 10%, the computed OAS of Bond C would *most likely* be:

A) lower than 50bps. ✓

B) higher than 50bps. ✗

C) equal to 50bps. ✗

Explanation

The OAS of the three bonds should be same as they are given to be identical bonds except for the embedded options (OAS is after removing the option feature and hence would not be affected by embedded options). Hence the OAS of bond C would be 50 bps absent any changes in assumed level of volatility.

When the assumed level of volatility in the tree is decreased, the value of the embedded put option would decrease and the *computed* value of the putable bond would also decrease. The constant spread that is now needed to force the computed value to be equal to the market price is therefore lower than before. Hence a decrease in the volatility estimate reduces the computed OAS for a putable bond.

(Study Session 13, Module 36.4, LOS 36.h)

Related Material

SchweserNotes - Book 4

Alnoor Hudda, CFA is valuing two floaters issued by Mateo Bank. Both floaters have a par value of $100, three year life and pay based on annual LIBOR. Hudda has generated the following binomial tree for libor.

1-year forward rates starting in year:

0	1	2
2%	5.7798%	6.0512%
	3.8743%	4.0562%
		2.7190%

Question #34 of 78

Value of a capped floater with a cap of 4% is closest to:

A) $98.70

B) $96.71

C) $97.38

Explanation

The cap will be in the money for nodes 2,UU; 2,UL; and 1,U.

$V_{2,UU}$ = 104/1.060512 = 98.07

$V_{2,UL}$ = 104/1.040562 = 99.95

$V_{2,UL}$ = 102.7190/1.027190 = 100

$$V_{1,U} = \frac{\left(\frac{98.07 + 99.95}{2} + 4\right)}{1.057798} = 97.38$$

$$V_{1,L} = \frac{\left(\frac{100 + 99.95}{2} + 3.8743\right)}{1.038743} = 99.98$$

$$V_0 = \frac{\left(\frac{97.38 + 99.98}{2} + 2\right)}{1.02} = 98.71$$

(Study Session 13, Module 36.7, LOS 36.m)

Related Material

SchweserNotes - Book 4

Question #35 of 78

Value of the cap in a capped floater with a cap of 4% is closest to:

A) $1.29

B) $1.23

C) $4.41

Explanation

value of the cap = $100 – $98.71 = $1.29

The cap will be in the money for nodes 2,UU; 2,UL; and 1,U.

$V_{2,UU}$ = 104/1.060512 = 98.07

$V_{2,UL}$ = 104/1.040562 = 99.95

$V_{2,UL}$ = 102.7190/1.027190 = 100

$$V_{1,U} = \frac{\left(\frac{98.07 + 99.95}{2} + 4\right)}{1.057798} = 97.38$$

$$V_{1,L} = \frac{\left(\frac{100 + 99.95}{2} + 3.8743\right)}{1.038743} = 99.98$$

$$V_0 = \frac{\left(\frac{97.38 + 99.98}{2} + 2\right)}{1.02} = 98.71$$

(Study Session 13, Module 36.7, LOS 36.m)

Related Material

SchweserNotes - Book 4

Question #36 of 78

Using the following tree of semiannual interest rates what is the value of a 5% callable bond that has one year remaining to maturity, a call price of 99 and pays coupons semiannually?

	7.76%
6.20%	
	5.45%

A) 98.29.

B) 97.17.

C) 99.01.

Explanation

The callable bond price tree is as follows:

		100.00
	A → 98.67	
98.29		100.00
	99.00	
		100.00

As an example, the price at node A is obtained as follows:

$Price_A$ = min[(prob × (P_{up} + (coupon / 2)) + prob × (P_{down} + (coupon/2)) / (1 + (rate / 2)), call price] = min[(0.5 × (100 + 2.5) + 0.5 × (100 + 2.5)) / (1 + (0.0776 / 2)), 99} = 98.67. The bond values at the other nodes are obtained in the same way.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #37 of 78

Bill Moxley, CFA is evaluating three bonds for inclusion in fixed income portfolio for one of his pension fund clients. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years. The yield curve is currently flat.

If the yield curve becomes downward sloping, the bond with the highest price impact is *least likely* to be:

A) Bond B ✓

B) Bond C ✗

C) Bond A ✗

Explanation

Due to the embedded call option, the upside potential of callable bond B is limited.

(Study Session 13, Module 36.3, LOS 36.e)

Related Material

SchweserNotes - Book 4

Question #38 of 78

For a convertible bond, which of the following is *least* accurate?

A) A convertible bond may be putable.

B) The conversion ratio times the price per share of common stock is a lower limit on the bond's price.

C) The issuer can decide when to convert the bonds to stock.

Explanation

All of these are true except the possibility of the issuer to force conversion. The bondholder has the option to convert.

(Study Session 13, Module 36, LOS 36.n)

Related Material

SchweserNotes - Book 4

Bill Woods, CFA, is a portfolio manager for Matrix Securities Fund, a closed-end bond fund that invests in U.S. Treasuries, mortgage-backed securities (MBS), asset-backed securities (ABS), and MBS derivatives. The fund has assets of approximately $400 million, has a current stock price of $14.50 and a net asset value (NAV) of $16.00. Woods is a member of a four person investment team that is responsible for all aspects of managing the portfolio, including interest rate forecasting, performing basic financial analysis and valuation of the portfolio, and selecting appropriate investments for Matrix. His expertise is in the analysis and valuation of MBS and ABS.

The fund pays a $0.12 monthly dividend that is paid from current income. The basic operating strategy of Matrix is to leverage its capital by investing in fixed income securities, and then financing those assets through repurchase agreements. Matrix then earns the spread between the net coupon of the underlying assets and the cost to finance the asset. Therefore, when evaluating a security for investment, it is critical that Matrix can be reasonably assured that it will earn a positive spread.

During the course of his analysis, Woods utilizes several methodologies to evaluate current portfolio holdings and potential investments. Valuation methods he uses include nominal spreads, Z-spreads, and option-adjusted spreads (OAS). There is ongoing debate among the investment team as to the merits and shortcomings of each of the methods. Woods believes that the OAS method is by far a superior tool in all circumstances, while his fellow portfolio manager, Yuri Ackerman, feels that each of the methods can at times serve a useful purpose. Wood and Ackerman's current discussion involves two similar FNMA adjustable-rate mortgage (ARM) securities Wood is considering purchasing. Both ARM "A" and ARM "B" are indexed off of 6-month LIBOR, are new production, and have similar net coupons.

Select Financial Information:

ARM	Net Coupon	WAM	Nominal Spread	OAS (bps)	Z-spread (bps)
A	6.27%	360	81	98	135
B	6.41%	358	95	116	129

Woods recommends that Matrix purchase ARM "A" with the 6.27% net coupon. He has based his conclusion on the calculated OAS of the securities, which he believes indicates that ARM "A" is the cheaper of the two securities. Ackerman disagrees with Woods, arguing that OAS is only one component of any analysis, and that a buy or sell recommendation should not be made based upon the OAS spread alone. Ackerman claims that other measures, such as one of the many duration measures and convexity, need to be incorporated into the analysis. He points out that both ARMs have equal convexities, but ARM "A" has a duration of 7.2 years and ARM "B" has duration of 6.8 years. These characteristics will affect the expected return in any interest rate scenario. Woods admits that he had not considered the differences in the bond's durations, and he acknowledges that others factors should be considered before a recommendation can be made.

Question #39 of 78

Woods is *most likely* resistant to the zero-volatility spread because the spread:

A) only considers one path of interest rates, the current Treasury spot rate curve.

B) does not indicate how much of the spread reflects the significant prepayment risk associated with MBS.

C) fails to consider price risk, which is uncertainty regarding terminal cash flows.

Explanation

Zero-volatility spread is a commonly used measure of relative value for MBS and ABS. However, it only considers one path of interest rates, while OAS considers every spot rate along every interest rate path.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #40 of 78

In general, the investment team at Matrix attempts to buy "cheap" securities because they are undervalued on a relative basis. What is a characteristic of a "cheap" security for a given Z-spread and effective duration?

A) High OAS relative to the required OAS and high option costs.

B) High OAS relative to the required OAS and low option costs.

C) Low OAS relative to the required OAS and low option costs.

Explanation

A higher OAS indicates a larger risk-adjusted spread, which leads to a lower relative price. The implied cost of the embedded option in a security with a call feature is the option cost, so a buyer would prefer a lower cost.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #41 of 78

Which of the two bonds Woods is considering purchasing has the greater interest rate exposure?

A) ARM B, because it has a smaller duration.

B) ARM A, because it has a larger duration.

C) The interest rate exposure cannot determine without a specific measure of convexity.

Explanation

Effective duration is a measure of interest rate risk. All things equal, the larger the duration of a security the greater the interest rate risk.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #42 of 78

Matrix also currently has investments in several ABS. Which of the following spread measures is *most appropriate* in the analysis of ABS backed by credit card receivables?

A) OAS, because the cash flows are interest rate path dependent.

B) Z-spread, because credit card ABS have no prepayment option.

C) Monte Carlo simulation model, because representative paths can be utilized.

Explanation

Credit card receivable-backed ABS have no prepayment option, therefore prepayments are not path dependent and the Z-spread is the most appropriate model.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #43 of 78

Which bonds would have its maturity-matched rate as its most critical rate?

A) High coupon callable bonds. ✗

B) Low coupon callable bonds. ✓

C) Low coupon putable bonds. ✗

Explanation

Callable bonds with low coupon rate are unlikely to be called; hence, their maturity-matched rate is their most critical rate (i.e., the highest key rate duration corresponds to the bond's maturity). Similarly, putable bonds with *high* coupon rates are unlikely to be put and are most sensitive to their maturity-matched rates.

(Study Session 13, Module 36.6, LOS 36.k)

Related Material

SchweserNotes - Book 4

Question #44 of 78

Bill Moxley, CFA is evaluating three bonds for inclusion in fixed income portfolio for one of his pension fund clients. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years. The yield curve is currently flat.

If the yield curve becomes upward sloping, the bond *least likely* to have the highest price impact would be:

A) Bond C ✓

B) Bond B ✗

C) Bond A ✗

Explanation

Bond C is putable and hence has limited downside potential when rates rise. The other two bonds do not have any such protection.

(Study Session 13, Module 36.3, LOS 36.e)

Related Material

SchweserNotes - Book 4

Question #45 of 78

Which of the following statements about how interest rate volatility affects the value bond is *most* accurate? When interest rate volatility increases, the value of a:

A) straight bond decreases. ✗

B) callable bond decreases. ✓

C) putable bond decreases ✗

Explanation

Option values are positively related to the volatility of the underlying. Thus, when interest rate volatility increases, the values of both call and put options increase. When interest rate volatility increases, the value of a callable bond (where the investor is short the call option) decreases and the value of a putable bond (where the investor is long the put option) increases. The value of a straight bond is unaffected by changes in the volatility of interest rate, though value is affected by changes in the level of interest rate.

(Study Session 13, Module 36.3, LOS 36.d)

Related Material

SchweserNotes - Book 4

Question #46 of 78

Suppose the market price of a convertible security is $1,050 and the conversion ratio is 26.64. What is the market conversion price?

A) $39.41. ✓

B) $1,050.00. ✗

C) $26.64. ✗

Explanation

The market conversion price is computed as follows:

> Market conversion price = market price of convertible security/conversion ratio = $1,050/26.64 = $39.41

(Study Session 13, Module 36.8, LOS 36.o)

Related Material

SchweserNotes - Book 4

Question #47 of 78

For a convertible bond without any other options, the call feature implied by the convertibility feature will do all of the following EXCEPT:

A) place a lower limit on the possible values of the bond. ✗

B) increase the value of the bond over that of a comparable option-free bond. ✗

C) cause negative convexity. ✓

Explanation

Negative convexity is caused by the bond being callable where the issuer has the embedded call option. Negative convexity does not apply to convertible bonds. The convertibility feature gives the bondholder a call option on the shares of common stock of the issuer. This increases the price of the bond and places a lower limit on the possible values of the bond. However, that lower limit will change with the price of the common stock.

(Study Session 13, Module 36, LOS 36.n)

Related Material

SchweserNotes - Book 4

Question #48 of 78

An analyst has constructed an interest rate tree for an on-the-run Treasury security. The analyst now wishes to use the tree to calculate the duration of the Treasury security. The usual way to do this is to estimate the changes in the bond's price associated with a:

A) parallel shift up and down of the forward rates implied by the binomial model. ✗

B) shift up and down in the current one-year spot rate all else held constant. ✗

C) parallel shift up and down of the yield curve. ✓

Explanation

The usual method is to apply parallel shifts to the yield curve, use those curves to compute new sets of forward rates, and then enter each set of rates into the interest rate tree. The resulting volatility of the present value of the bond is the measure of effective duration.

(Study Session 13, Module 36.5, LOS 36.i)

Related Material

SchweserNotes - Book 4

Question #49 of 78

Mike Diffle has been asked to evaluate the bonds of Hardin, Inc. The specific issue Diffle is considering has an 8% annual coupon and matures in two years. The bonds are currently callable at 101, and beginning in six months, they are callable at par. Bratton Corporation, Hardin's competitor, also has bonds outstanding which are identical to Hardin's except that they are not callable. Diffle believes the AA rating of both bonds is an accurate reflection of their credit risk. Diffle is wondering if the Bratton bonds might be a better investment than the Hardin bonds. Assume that the following 1-year interest rate tree is used to value bonds with a maturity of up to three years (this tree assumes interest rate volatility of 10%).

Today	Year 1	Year 2
		9.324%
	8.530%	
7.250%		7.634%
	6.983%	
		6.250%

Also, assume that the appropriate spot rates for securities maturing in one, two, and three years are 7.25%, 7.5%, and 7.80%, respectively.

Diffle believes he should begin his analysis with the option-free Bratton bonds. He decides to consider two different approaches to valuing the Bratton Bonds—one that uses the current spot rate curve and another that uses the interest rate tree given above.

For the next step in his analysis, Diffle has decided to calculate the value of the Hardin bonds using the interest rate tree. His assumption is that the bond will be called at any node of the tree where the calculated value exceeds the call price. Diffle summarizes the results of his bond valuation analysis in a memo to his supervisor, Luke Puldo. In this memo, Diffle makes the following statements:

Statement 1: The value of the option embedded in the Hardin bonds can be derived by simply subtracting the interest rate tree value of the Hardin bonds from the interest rate tree value of the Bratton bonds.

Statement 2: I am concerned that the 10% volatility assumption used to develop the interest rate tree might be too low. A higher volatility assumption would result in a lower value for the Hardin bonds.

After reviewing Diffle's analysis, Puldo notes that Diffle has not included any information on the option adjusted spread (OAS) for the Hardin bonds. Puldo suggests that Diffle should evaluate the OAS in order to get an idea of the liquidity risk of the Hardin bonds. Diffle counters that the OAS may not be very informative in this case, since he is uncertain as to the reliability of the interest rate volatility assumption.

To finish his analysis, Diffle would like to use his binomial model to evaluate the interest rate risk of both the Hardin bonds and the Bratton bonds. Diffle has shocked interest rates by 25 basis points throughout the interest rate tree he has been using to value the two bond issues. Using the new rates, Diffle has calculated values for the bonds assuming a 25-basis-point increase or decrease in rates. He plans to use these values as inputs into the following formulas for duration and convexity:

$$\text{duration} = \frac{V_- - V_+}{2 \times V_0 \times \Delta y} \qquad \text{convexity} = \frac{V_+ + V_- - 2V_0}{2 \times V_0 \times (\Delta y)^2}$$

Puldo still believes that Diffle must include the OAS for the Hardin bonds in his report. Puldo points out that a proper benchmark is critical to any OAS analysis. Which of the following statements regarding benchmark interest rates and OAS is *most* accurate? Since liquidity risk is a critical issue, the OAS calculation for the Hardin bonds should:

A) use on-the-run U.S. Treasury rates as a benchmark in order to isolate the credit risk of the Hardin bonds.

B) be based on a benchmark that has no credit risk.

C) use on-the-run interest rates for other callable Hardin bonds as a benchmark in order to isolate the liquidity risk of the 2-year bond issue.

Explanation

By using on-the-run rates of the issuing company, there will be no difference in credit risk captured in the spread. The only risk left will be liquidity risk. Using on-the-run U.S. Treasury rates is incorrect because using U.S. Treasury rates would not isolate the credit risk since liquidity risk would also be included. Using a benchmark that has no credit risk would not help differentiate the Hardin bonds from the Bratton bonds.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #50 of 78

As the volatility of interest rates increases, the value of a callable bond will:

A) decline.

B) rise if the interest rate is below the coupon rate, and fall if the interest rate is above the coupon rate.

C) rise.

Explanation

As volatility increases, so will the option value, which means the value of a callable bond will decline. Remember that with a callable bond, the investor is short the call option.

(Study Session 13, Module 36.3, LOS 36.d)

Related Material

SchweserNotes - Book 4

Question #51 of 78

As the volatility of interest rates increases, the value of a putable bond will:

A) rise if the interest rate is below the coupon rate, and fall if the interest rate is above the coupon rate. ✗

B) rise. ✓

C) decline. ✗

Explanation

As volatility increases, so will the option value, which means the value of a putable bond will rise. Remember that with a putable bond, the investor is long the put option.

(Study Session 13, Module 36.3, LOS 36.d)

Related Material

SchweserNotes - Book 4

Question #52 of 78

On a given day, a bond with a call provision rose in value by 1%. What can be said about the level and volatility of interest rates?

A) A possibility is that the level of interest rates remained constant, but the volatility of interest rates fell. ✓

B) The only possible explanation is that level of interest rates fell. ✗

C) A possibility is that the level of interest rates remained constant, but the volatility of interest rates rose. ✗

Explanation

As volatility declines, so will the option value, which means the value of a callable bond will rise.

(Study Session 13, Module 36.3, LOS 36.d)

Related Material

SchweserNotes - Book 4

Question #53 of 78

For an option-free bond trading at par, it is *least likely* that:

A) Its maturity key rate duration is the same as its effective duration.

B) The rate durations for all the rates other than the maturity-matched rate are zero.

C) The spot rate for the maturity of the bond is least important rate affecting the value of the bond.

Explanation

If an option-free bond is trading at par, the bond's maturity-matched rate (or the spot rate applicable to its maturity) is the only rate that affects the bond's value. Its maturity key rate duration is the same as its effective duration, and all other key rate durations are zero.

(Study Session 13, Module 36.6, LOS 36.k)

Related Material

SchweserNotes - Book 4

Question #54 of 78

An analyst has constructed an interest rate tree for an on-the-run Treasury security. The analyst now wishes to use the tree to calculate the convexity of a callable corporate bond with maturity and coupon equal to that of the Treasury security. The usual way to do this is to calculate the option-adjusted spread (OAS):

A) compute the convexity of the Treasury security, and divide by (1+OAS).

B) shift the Treasury yield curve, compute the new forward rates, add the OAS to those forward rates, enter the adjusted values into the interest rate tree, and then use the usual

C) compute the convexity of the Treasury security, and add the OAS.

Explanation

The analyst uses the usual convexity formula, where the upper and lower values of the bonds are determined using the tree.

(Study Session 13, Module 36.5, LOS 36.i)

Related Material

SchweserNotes - Book 4

Question #55 of 78

Using the following tree of semiannual interest rates what is the value of a putable semiannual bond that has one year remaining to maturity, a put price of 98 and a 4% coupon rate? The bond is putable today.

	7.59%
6.35%	
	5.33%

A) 97.92.

B) 98.75.

C) 98.00.

Explanation

The putable bond price tree is as follows:

		100.00
	A ==> 98.27	
98.00		100.00
	99.35	
		100.00

As an example, the price at node A is obtained as follows:

$Price_A$ = max{(prob × (P_{up} + coupon/2) + prob × (P_{down} + coupon/2))/(1 + rate/2), putl price} = max{(0.5 × (100 + 2) + 0.5 × (100 + 2))/(1 + 0.0759/2),98} = 98.27. The bond values at the other nodes are obtained in the same way.

The price at node 0 = [0.5 × (98.27+2) + 0.5 × (99.35+2)]/ (1 + 0.0635/2) = $97.71 but since this is less than the put price of $98 the bond price will be $98.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #56 of 78

If a bond's key rate durations for maturity points shorter than the bond's maturity are negative, it is *most likely* that the bond being analyzed is a:

A) Zero coupon bond. ✓

B) Callable bond ✗

C) Putable bond ✗

Explanation

If a bond is a zero-coupon bond (or if it has a "very low" coupon), key rate durations for maturity points that are shorter than the maturity of the bond being analyzed are generally negative. For example, the five-year key rate duration for a 10-year zero-coupon bond can be expected to be less than zero.

(Study Session 13, Module 36.6, LOS 36.k)

Related Material

SchweserNotes - Book 4

Question #57 of 78

Joseph Dentice, CFA is evaluating three bonds. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years.

If interest rates decrease, the duration of which bond is *most likely* to decrease?

A) Bond A. ✗

B) Bond B. ✓

C) Bond C. ✗

Explanation

Decrease in rates would increase the likelihood of the call option being exercised and reduce the expected life (and duration) of the callable bond the most.

(Study Session 13, Module 36.5, LOS 36.j)

Related Material

SchweserNotes - Book 4

Question #58 of 78

For a convertible bond with a call provision, with respect to the bond's convertibility feature and the call feature, the Black-Scholes option model can apply to:

A) neither features. ✗

B) both features.

C) only one feature.

Explanation

The Black-Scholes model applies to the convertibility feature just as it does to the common stock. The Black-Scholes model is not appropriate for the call feature because the volatility of the bond cannot be assumed constant.

(Study Session 13, Module 36, LOS 36.n)

Related Material

SchweserNotes - Book 4

Question #59 of 78

A callable bond and an option-free bond have the same coupon, maturity and rating. The callable bond currently trades at par value. Which of the following lists *correctly* orders the values of the indicated items from lowest to highest?

A) Embedded call, callable bond, $0, option-free bond.

B) $0, embedded call, callable bond, option-free bond.

C) Embedded call, $0, callable bond, option-free bond.

Explanation

The embedded call will always have a positive value prior to expiration, and this is especially true if the callable bond trades at par value. Since investors must be compensated for the call feature, the value of the option-free bond must exceed that of a callable bond with the same coupon and maturity and rating.

(Study Session 13, Module 36.2, LOS 36.c)

Related Material

SchweserNotes - Book 4

Question #60 of 78

Using the following binomial interest rate tree, calculate the value of a two-year, 2.5% putable bond. The American style embedded put option can be exercised anytime and has a strike price of 99. The value is *closest* to:

	3.75%
3.175%	
	2.665%

A) 99.00.

B) 98.75.

C) 97.92.

Explanation

The putable bond price tree is as follows:

	A ==> 99.00	
99.00		
	99.84	

As an example, the price at node A is obtained as follows:

PriceA = max[par value + coupon / (1 + rate), put price] = max[(100 + 2.5) / (1 + 0.0375) ,99] = 99.00. The bond values at the other nodes are obtained in the same way.

The calculated price at node 0 =

[0.5(99.00 + 2.5) + 0.5(99.84 + 2.5)] / (1 + 0.03175) = $98.78 but since the put price is $99 the price of the bond will not go below $99.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #61 of 78

A CFA charter holder observes a 12-year 7 ¾ percent semiannual coupon bond trading at 102.9525. If interest rates *rise* immediately by 50 basis points the bond will sell for 99.0409. If interest rates *fall* immediately by 50 basis points the bond will sell for 107.0719. What are the bond's effective duration (ED) and effective convexity (EC).

A) ED = 7.801, EC = 80.73.

B) ED = 40.368, EC = 7.801.

C) ED = 8.031, EC = 2445.120.

Explanation

ED = $(V_- - V_+) / (2V_0(\Delta y))$

= $(107.0719 - 99.0409) / (2 \times 102.9525 \times 0.005) = 7.801$

EC = $(V_- + V_+ - 2V_0) / (V_0(\Delta y)^2)$

= $(107.0719 + 99.0409 - (2 \times 102.9525)) / [(102.9525 \times (0.005)^2)] = 80.73$

(Study Session 13, Module 36.5, LOS 36.i)

Related Material

SchweserNotes - Book 4

Question #62 of 78

The value of a callable bond is equal to the:

A) callable bond value minus the value of the put option minus the value of the call option.

B) callable bond plus the value of the embedded call option.

C) option-free bond value minus the value of the call option.

Explanation

The value of a bond with an embedded call option is simply the value of a noncallable ($V_{noncallable}$) bond minus the value of the option (V_{call}). That is: $V_{callable} = V_{noncallable} - V_{call}$.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #63 of 78

Which of the following is equal to the value of the putable bond? The putable bond value is equal to the:

A) callable bond plus the value of the put option.

B) option-free bond value minus the value of the put option.

C) option-free bond value plus the value of the put option.

Explanation

The value of a putable bond can be expressed as $V_{putable} = V_{nonputable} + V_{put}$.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #64 of 78

Generally speaking, an analyst would like the option adjusted spread (OAS) to be large, controlling for:

A) Credit and liquidity risk. ✓

B) Option risk. ✗

C) Credit, liquidity and option risk. ✗

Explanation

OAS is "Option-adjusted" and hence includes no compensation for option risk: OAS is compensation for taking credit and liquidity risk. (Nominal spread, by comparison, includes compensation for liquidity risk, credit risk, and option risk.) Analysts prefer higher OAS, after controlling for credit and liquidity risk.

(Study Session 13, Module 36.4, LOS 36.g)

Related Material

SchweserNotes - Book 4

Question #65 of 78

The primary benefit of owning a convertible bond over owning the common stock of a corporation is the:

A) bond has lower downside risk. ✓

B) conversion premium. ✗

C) bond has more upside potential. ✗

Explanation

The straight value of the bond forms a floor for the convertible bond's price. This lowers the downside risk. The conversion premium is a disadvantage of owning the convertible bond, and it is the reason the bond has lower upside potential when compared to the stock.

(Study Session 13, Module 36.8, LOS 36.q)

Related Material

SchweserNotes - Book 4

Question #66 of 78

Kylie Autumn, CFA, is a consultant with Tri-Vision Group. Robert Lullum, Senior Vice President at Langsford Investments, has asked for assistance with the evaluation of mortgage-backed and collateralized mortgage obligation (CMO) derivative securities for potential inclusion in several client portfolios. Langsford Investments mainly deals with equity investments and REITs, but the company recently purchased a small firm that invests mainly in fixed-income securities.

Lullum has done some research on the appropriate spread measures and option valuation models for fixed-income securities and wants to clarify some points. He wants to know if the following statements are correct:

Statement 1:	The proper spread measure for option-free corporate bonds is the nominal spread.
Statement 2:	Callable corporate bonds and mortgage-backed securities should be measured using the option-added spread.
Statement 3:	The Z-spread is appropriate for credit card ABS and auto loan ABS.

While Lullum meets with Autumn, Janet Van Ark, CFA charterholder and equity income portfolio manager for Langsford, is attempting to purchase bonds that may also provide her with equity exposure in the future. She has decided to analyze an 8% annual coupon bond with exactly 20 years to maturity. The bonds are convertible into 10 common shares for each $1,000 of par (face) value. The bond's market price is $920, and the common stock has a market price of $40. VanArk estimates that the stock will increase in value to $70 within the next two years. The stock's annual dividend is $0.40 per share, and the market yield on comparable non-convertible bonds is 9.5%.

Carl Leighton, a Langsford analyst and Level II CFA candidate, works with mortgage-backed and other asset-based securities. He provides Lullum with a list of credit enhancements for asset-backed securities, which includes letters of credit, excess servicing spread funds, overcollateralization, and bond insurance. Lullum then asks him for a status report of the firm's exposure to paythrough securities. He also asks Leighton to calculate the single-monthly mortality rate (SMM) and estimate the prepayment for the month for a seasoned mortgage pool with a $500,000 principal balance remaining. The scheduled monthly principal payment is $150 and the conditional prepayment rate (CPR) is 7%.

Van Ark computes the convertible bond's market conversion premium per share (MCPPS) using only the information given, and then wants to know how a sudden increase in the stock price of $2 would impact the bond price. Which of the following choices is *most* correct?

A) The sudden $2 increase would have a small effect. ✓

B) The original MCPPS is $60 per share. ✗

C) The sudden $2 increase would have a large effect.

Explanation

The MCPPS is the difference between the conversion value and the bond's current market price, on a per share basis.

$$\text{MCPPS} = \frac{920}{10} - 40 = \$52 \text{ per share}$$

Regarding the stock price increase, the convertible bond is essentially a straight bond (i.e., no conversion privilege), plus a call option on the underlying common stock. In this case, the option is far out of the money. So, while the increase in the stock price will have a positive impact on the bond, the impact will be small because the delta is close to zero for options that are far out of the money.

(Study Session 13, Module 36.8, LOS 36.o)

Related Material

SchweserNotes - Book 4

Question #67 of 78

Which of the following *most accurately* explains how the effective convexity is computed using the binomial model. In order to compute the effective convexity the:

A) volatility has to be shifted upward and downward and the binomial tree recalculated each time.

B) binomial tree has to be shifted upward and downward by the same amount for all nodes.

C) yield curve has to be shifted upward and downward in a parallel manner and the binomial tree recalculated each time.

Explanation

Apply parallel shifts to the yield curve and use these curves to compute new forward rates in the interest rate tree. The resulting bond values are then used to compute the effective convexity.

(Study Session 13, Module 36.5, LOS 36.i)

Related Material

SchweserNotes - Book 4

Question #68 of 78

Joseph Dentice, CFA is evaluating three bonds. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years.

If interest rates increase, the duration of which bond is *most likely* to decrease?

A) Bond B.

B) Bond A.

C) Bond C.

Explanation

Increase in rates would increase the likelihood of the put option being exercised and reduce the expected life (and duration) of the putable bond the most.

(Study Session 13, Module 36.5, LOS 36.j)

Related Material

SchweserNotes - Book 4

Question #69 of 78

Joseph Dentice, CFA is evaluating three bonds. All three bonds have a coupon rate of 3%, maturity of five years and are generally identical in every respect except that bond A is an option-free bond, bond B is callable in two years and bond C is putable in two years.

The bond with the lowest duration is *least likely* to be:

A) Bond C.

B) Bond B.

C) Bond A.

Explanation

Bond A is option-free and would have a duration that is equal to or greater than the duration of bonds B and C.

(Study Session 13, Module 36.5, LOS 36.j)

Related Material

SchweserNotes - Book 4

Question #70 of 78

Which of the following is equal to the value of a noncallable / nonputable convertible bond? The value of the corresponding:

A) straight bond plus the value of the call option on the stock. ✓

B) callable bond plus the value of the call option on the stock. ✗

C) straight bond. ✗

Explanation

The value of a noncallable/nonputable convertible bond can be expressed as:

Option-free convertible bond value = straight value + value of the call option on the stock.

(Study Session 13, Module 36, LOS 36.n)

Related Material

SchweserNotes - Book 4

Question #71 of 78

Which of the following *correctly* describes one of the basic features of a convertible bond? A convertible bond is a security that can be converted into:

A) common stock at the option of the issuer. ✗

B) common stock at the option of the investor. ✓

C) another bond at the option of the issuer. ✗

Explanation

The owner of a convertible bond can exchange the bond for the common shares of the issuer.

(Study Session 13, Module 36, LOS 36.n)

Related Material

SchweserNotes - Book 4

Question #72 of 78

Which of the following is the appropriate "nodal decision" within the backward induction methodology of the interest tree framework for a callable bond?

A) Max(call price, discounted value). ✗

B) Min(call price, discounted value). ✓

C) Min(par value, discounted value). ✗

Explanation

When valuing a callable bond using the backward induction methodology, the relevant cash flow to use at each nodal period is the coupon to be received during that nodal period plus the computed value or the call price, whichever is less.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #73 of 78

A callable bond and an option-free bond have the same coupon, maturity and rating. The callable bond currently trades at par value. Which of the following lists *correctly* orders the values of the indicated items from lowest to highest?

A) $0, embedded call, callable bond, option-free bond. ✓

B) Embedded call, callable bond, $0, option-free bond. ✗

C) Embedded call, $0, callable bond, option-free bond. ✗

Explanation

The embedded call will always have a positive value prior to expiration, and this is especially true if the callable bond trades at par value. Since investors must be compensated for the call feature, the value of the option-free bond must exceed that of a callable bond with the same coupon and maturity and rating.

(Study Session 13, Module 36.1, LOS 36.b)

Related Material

SchweserNotes - Book 4

Question #74 of 78

A putable bond with a 6.4% annual coupon will mature in two years at par value. The current one-year spot rate is 7.6%. For the second year, the yield volatility model forecasts that the one-year rate will be either 6.8% or 7.6%. The bond is putable in one year at 99. Using a binomial interest rate tree, what is the current price?

A) 98.885. ✗

B) 98.246. ✓

C) 98.190. ✗

Explanation

The tree will have three nodal periods: 0, 1, and 2. The goal is to find the value at node 0. We know the value at all nodes in nodal period 2: V_2=100. In nodal period 1, there will be two possible prices:

$$V_{i,U} = [(100 + 6.4) / 1.076 + (100+6.4) / 1.076] / 2 = 98.885$$

$$V_{i,L} = [(100 + 6.4) / 1.068 + (100 + 6.4) / 1.068] / 2 = 99.625.$$

Since 98.885 is less than the put price, $V_{i,U}$ = 99

$$V_0 = [(99 + 6.4) / 1.076) + (99.625 + 6.4) / 1.076)] / 2 = 98.246.$$

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #75 of 78

Using the following tree of semiannual interest rates what is the value of a callable bond that has one year remaining to maturity, a call price of 99 and a 5% coupon rate that pays semiannually?

	7.59%
6.35%	
	5.33%

A) 99.21.

B) 98.26.

C) 98.65.

Explanation

The callable bond price tree is as follows:

		100.00
	98.75	
98.26		100.00
	99.00	
		100.00

The formula for the price at each node is:

Price = min{(prob × (P_{up} + coupon/2) + prob × (P_{down} + coupon/2)) / (1 + rate/2), call price}.

Up Node at t = 0.5: min{(0.5 × (100 + 2.5) + 0.5 × (100 + 2.5)) / (1 + 0.0759/2), 99} = 98.75.

Down Node at t = 0.5: min{(0.5 × (100 + 2.5) + 0.5 × (100 + 2.5)) / (1 + 0.0533/2), 99} = 99.00.

Node at t = 0.0: min{(0.5 × (98.75 + 2.5) + 0.5 × (99 + 2.5)) / (1 + 0.0635/2), 99} = 98.26.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #76 of 78

A convertible bond has a conversion ratio of 12 and a straight value of $1,010. The market value of the bond is $1,055, and the market value of the stock is $75. What is the market conversion price and premium over straight value of the bond?

	Market conversion price	Premium over straight value	
A)	$87.92	0.0446	✓
B)	$75.00	0.1029	✗
C)	$84.17	0.1222	✗

Explanation

The market conversion price is:

(market price of the bond) / (conversion ratio) = $1,055 / 12 = $87.92.

The premium over straight price is:

(market price of bond) / (straight value) − 1 = ($1,055 / $1,010) − 1 = 0.0446.

(Study Session 13, Module 36.8, LOS 36.o)

Related Material

SchweserNotes - Book 4

Question #77 of 78

Patrick Wall is a new associate at a large international financial institution. His boss, C.D. Johnson, is responsible for familiarizing Wall with the basics of fixed income investing. Johnson asks Wall to evaluate the two otherwise identical bonds shown in Table 1. The callable bond is callable at 100 and exercisable on the coupon dates only.

Wall is told to evaluate the bonds with respect to duration and convexity when interest rates decline by 50 basis points at all maturities over the next six months.

Johnson supplies Wall with the requisite interest rate tree shown in Figure 1. Johnson explains to Wall that the prices of the bonds in Table 1 were computed using the interest rate lattice. Johnson instructs Wall to try and replicate the information in Table 1 and use his analysis to derive an investment decision for his portfolio.

Table 1 Bond Descriptions

	Non-callable Bond	Callable Bond
Price	$100.83	$98.79
Time to Maturity (years)	5	5
Time to First Call Date	--	0
Annual Coupon	$6.25	$6.25
Interest Payment	Semi-annual	Semi-annual
Yield to Maturity	6.0547%	6.5366%
Price Value per Basis Point	428.0360	--

Figure 1

									15.44%
								14.10%	
							12.69%		12.46%
						11.85%		11.38%	
					9.75%		10.25%		10.05%
				8.95%		9.57%		9.19%	
			7.91%		7.88%		8.28%		8.11%
		7.35%		7.23%		7.74%		7.42%	
	6.62%		6.40%		6.37%		6.69%		6.54%
6.05%		5.95%		5.85%		6.25%		5.99%	
	5.36%		5.17%		5.15%		5.40%		5.28%

		4.81%		4.73%		5.05%		4.83%	
			4.18%		4.16%		4.36%		4.26%
				3.82%		4.08%		3.90%	
					3.37%		3.52%		3.44%
						3.30%		3.15%	
							2.84%		2.77%
								2.54%	
									2.24%
Years	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5

Given the following relevant part of the interest rate tree, the value of the callable bond at node A is *closest* to:

	3.44%
3.15%	
	2.77%

A) $100.00.

B) $103.56

C) $101.53.

Explanation

The value of the callable bond at node A is obtained as follows:

Bond Value = the lesser of the Call Price or {0.5 × [Bond $Value_{up}$ + Coupon/2] + 0.5 × [Bond $Value_{down}$ + Coupon/2]}/(1 + Interest Rate/2)]

So we have

Bond Value at node A = the lesser of either $100 or {0.5 × [$100.00 + $6.25/2] + 0.5 × [$100.00+ $6.25/2]}/(1+ 3.15%/2) = $101.52. Since the call price of $100 is less than the computed value of $101.52 the bond price would be $100 because once the price of the bond reached this value it would be called.

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

SchweserNotes - Book 4

Question #78 of 78

A callable bond with an 8.2% annual coupon will mature in two years at par value. The current one-year spot rate is 7.9%. For the second year, the yield-volatility model forecasts that the one-year rate will be either 6.8% or 7.6%. The call price is 101. Using a binomial interest rate tree, what is the current price?

A) 101.000.

B) 100.279.

C) 100.558.

Explanation

The tree will have three nodal periods: 0, 1, and 2. The goal is to find the value at node 0. We know the value for all the nodes in nodal period 2: V_2=100. In nodal period 1, there will be two possible prices:

$$V_{1,U} = [(100+8.2)/1.076+(100+8.2)/1.076]/2 = 100.558$$

$$V_{1,L} = [(100+8.2)/1.068+(100+8.2)/1.068]/2 = 101.311$$

Since $V_{1,L}$ is greater than the call price, the call price is entered into the formula below:

$$V_0=[(100.558+8.2)/1.079)+(101+8.2)/1.079)]/2 = 101.000.$$

(Study Session 13, Module 36.2, LOS 36.f)

Related Material

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