1. Money market securities: 债券在一年内到期的；

Capital market securities: 债券在一年以上到期的；

Foreign bonds: are from foreign issuers but in local currency; it issued in a specific country which is different from Eurobonds which issued globally;

Eurobonds: are issued outside of any single country and denominated in a currency other than that of countries in which they trade;

**Dual-currency bond**: makes coupon interest payments in one currency and the principal payment at maturity in another currency;

Currency option bond: gives bondholders a choice of which of two currencies they would like to receive;

**Fully amortizing loan: 例如房贷**，每期都偿还一些本金，不会等到最后一期再整体偿还本金；

Partially amortizing loan: 最后一期会有一部分balloon payment，但不像bullet structure那样把所有的本金都放在最后一期再付；

Floating rate notes = market rate (reference rate) + basis points (interest margin)

Capital-indexed bonds: the coupon rate remains constant, and the principal value of the bonds is increased by the rate of inflation or decreased by deflation;

Sinking fund: to reduce the credit risk of a bond by redeeming part of the bond issue periodically over a bond’s life.

**Shelf registration 上架注册**：是指在监管部门那里注册一个总体融资额度，需要资金时逐笔发行债券，不必再走一遍注册流程

**Syndicated loan 银团贷款**：是指一组贷款人针对一个借款人的银行贷款

**Agency or quasi**-government bonds are issued by government sponsored entities and may be explicitly or implicitly backed by the government;

**Non**-sovereign government bonds are issued by government below national level, normally not backed by government;

1. 债券价格与利率呈[负相关关系](http://www.baidu.com/s?wd=%E8%B4%9F%E7%9B%B8%E5%85%B3%E5%85%B3%E7%B3%BB&tn=44039180_cpr&fenlei=mv6quAkxTZn0IZRqIHckPjm4nH00T1Y3nHbvmWcknW6LPjw-uAnd0ZwV5Hcvrjm3rH6sPfKWUMw85HfYnjn4nH6sgvPsT6KdThsqpZwYTjCEQLGCpyw9Uz4Bmy-bIi4WUvYETgN-TLwGUv3EnHRYnjf1rHD1PWmdPHmdrHR3Ps" \t "_blank)主要由于债券的理论价值是采用[现金流贴现](http://www.baidu.com/s?wd=%E7%8E%B0%E9%87%91%E6%B5%81%E8%B4%B4%E7%8E%B0&tn=44039180_cpr&fenlei=mv6quAkxTZn0IZRqIHckPjm4nH00T1Y3nHbvmWcknW6LPjw-uAnd0ZwV5Hcvrjm3rH6sPfKWUMw85HfYnjn4nH6sgvPsT6KdThsqpZwYTjCEQLGCpyw9Uz4Bmy-bIi4WUvYETgN-TLwGUv3EnHRYnjf1rHD1PWmdPHmdrHR3Ps" \t "_blank)法方式进行计算的，一般来说债券在不违约的前提下，其未来现金流是可预期的，而在[现金流贴现](http://www.baidu.com/s?wd=%E7%8E%B0%E9%87%91%E6%B5%81%E8%B4%B4%E7%8E%B0&tn=44039180_cpr&fenlei=mv6quAkxTZn0IZRqIHckPjm4nH00T1Y3nHbvmWcknW6LPjw-uAnd0ZwV5Hcvrjm3rH6sPfKWUMw85HfYnjn4nH6sgvPsT6KdThsqpZwYTjCEQLGCpyw9Uz4Bmy-bIi4WUvYETgN-TLwGUv3EnHRYnjf1rHD1PWmdPHmdrHR3Ps" \t "_blank)法方式下债券[现金流贴现](http://www.baidu.com/s?wd=%E7%8E%B0%E9%87%91%E6%B5%81%E8%B4%B4%E7%8E%B0&tn=44039180_cpr&fenlei=mv6quAkxTZn0IZRqIHckPjm4nH00T1Y3nHbvmWcknW6LPjw-uAnd0ZwV5Hcvrjm3rH6sPfKWUMw85HfYnjn4nH6sgvPsT6KdThsqpZwYTjCEQLGCpyw9Uz4Bmy-bIi4WUvYETgN-TLwGUv3EnHRYnjf1rHD1PWmdPHmdrHR3Ps" \t "_blank)计算过程中是用各期的现金流除以[(1+利率)之和后的对应现金流的时间次幂]，然后求总和，即利率高计算出来的债券理论价值就会低，利率低计算出来的债券理论价值就会高。故此[市场利率](http://www.baidu.com/s?wd=%E5%B8%82%E5%9C%BA%E5%88%A9%E7%8E%87&tn=44039180_cpr&fenlei=mv6quAkxTZn0IZRqIHckPjm4nH00T1Y3nHbvmWcknW6LPjw-uAnd0ZwV5Hcvrjm3rH6sPfKWUMw85HfYnjn4nH6sgvPsT6KdThsqpZwYTjCEQLGCpyw9Uz4Bmy-bIi4WUvYETgN-TLwGUv3EnHRYnjf1rHD1PWmdPHmdrHR3Ps" \t "_blank)升高会导致债券价格下跌；
2. Other things equal, decrease in a bond’s rating (an increased probability of default) will decrease the price of the bond, thus increasing its yield;

Priority of bankruptcy or liquidation for bond: secured bond> senior unsecured bond> subordinated次级债券> junior> debt

1. Callable bonds: 市场利率下降时，对发行人有利；

Putable bonds: 市场利率上升时，对持券者有利；

Convertible bonds: 股票价格上升时，对持券者有利；

1. **Taxation of bond income**

* **The interest income paid to bondholders is taxed as ordinary income**. However, it is exempted if issued by municipal (市政的) government;
* When a bondholder sells a coupon bond **prior to maturity**, it may be at a gain or loss. Such gain or losses are considered capital gains income, which **taxed at a lower rate than ordinary income;**

1. The difference between a serial bond issue(系列债券发行) and a sinking fund

A serial bond issue, investors know at issuance when specific bonds will be redeemed;

A bond issue that does not have a serial maturity structure and all bonds maturing on the same date;

1. 固定市场收益知识点：

* 公司债券： 短期债券最长5年到期；中期债券5到12年；长期债券超过12年；
* 固定收益市场按照票面利息类型分为固定利率—利率风险相对较高；

浮动利率—利率风险相对较低；

* London interbank offered rate (LIBOR)：无担保，是市场上最常见的reference rate for floating-rate bonds, 由参加调查的18家银行在银行同业间借款利率的平均数决定
* Money market mutual funds and savings accounts 的利息大于活期账户 (checking account);
* negotiable certificate of deposit 可转让定期存单：具有大面额，流动性高，风险低的特点
* Repo rate回购利率：是指repurchase price 和amount borrowed 的差额；
* Repo margin回购保证金：是指market value 和 amount borrowed的差额；

1. **债券价格与收益率的关系（参考note page 37 figure 3图示记忆）：**

* 由于债券价格与市场利率之间的反向关系是非线性的，债券价格上升的速度要大于其下降的速度—即figure 3中下面是YTM 12%而不是9%才会对称，如果是9%的话，债券价格会更接近1000；
* 市场收益率变动数量相同时，票面利率更低的债券会有更大的价格百分比变动—如上一点类似，3%变动的价格会大于9%变动的价格；原理是票面利率越低，债券后期支付的现金流所占比重就越大（因为在分母，贴现率更小，所以影响的幅度更大），受到贴现率变动的影响就会越大；
* 越低的coupon rate的bond, 在market rate一定的情况下，价格变化幅度越大；
* 市场收益率变动数量相同，到期期限更长的债券会有更大的价格百分比变动。因为期限越长，后期支付的现金流受到贴现率变动的影响就越大；

1. 计算full price (dirty price), flat price (clean price), accrued interest

Full price= par value \* (1+ YTM) t/T

Full price= flat price + accrued interest

Accrued interest= coupon payment \* (t/T)

**t代表上次coupon payment date到purchased settle date之间的天数;**

T代表两次coupon payment date之间的天数；

1. 计算matrix pricing （矩阵定价）:is a method used to estimate the yield-to-maturity for bonds that are not traded or infrequently traded;

* **计算5年债券的到期价格**：给出的条件是4年的YTM和六年的YTM

计算思路：先算出6年的债券平均YTM，再算出6年和4年平均YTM，得出5年的YTM，之后通过计算器算出estimated value;

* **计算6年公司债券的到期价格**：给出的条件是5年的US treasury bond YTM, 5年公司债券YTM，7年US treasury bond YTM, 7年公司债券YTM，6年US treasury bond YTM;

计算思路：先计算出5年US treasury bond和公司债券的spread差额YTM，再计算出7年US treasury bond和公司债券的spread差额YTM，之后两者平均值就是6年差额的平均值，此平均值加上6年 US treasury bond的YTM得出6年公司债券的YTM。

原理：把US treasury bond的YTM当作计算基础；

* **计算5年债券的到期价格：给出的条件是4年债券的YTM和7年债券的YTM；**

**5年债券的YTM= 4年的YTM + (5-4)/(7-4) \* (7年的YTM - 4年的YTM)**

1. 计算adjusting yields for periodicity：这里指的是有效收益率，而之前涉及到的是YTM

例如给出4% on a semiannual bond basis，需要计算出annual-pay bond 和 quarterly-pay bond----详见note 例题 page 43

**注意：**经常需要将1年分为M期的年利率APRm 转换为1年分为N期的年利率APRn,要保证其转换前后有效年利率不发生变动，即：

(1+ APRm/M ) M = (1+ APRn/N ) n

比如半年期的年利率为4%，计算季度的年利率：

(1+ 4%/2)2 = (1+ X/4)4 , X= 0.995%，则按季度的年利率= 4\* 0.995% = 3.98%

1. Current yield = annual cash coupon payment / bond price (净价) 是仅考虑利息收入带来的收益率，不考虑资本利得和再投资收入 具体详见note page 44

Simple yield简单收益率：是指全年票面利息收入加上损益在当年的直线摊销，除以债券的净价

下面三个的计算详见note page 44-45

Yield-to-call 赎回收益率：是指赎回节点的收益率；

Yield-to-worst 最差收益率

Yield-to-first par call 是指在票面价格 (par value) 赎回的收益率

Par curve or par bond yield curve: 平价债券曲线

计算bond value using forward rate:

相关公式： PMT / (1+ S1) + PMT / (1+ S2)2 + PMT/ (1+ S3)3 = 100

1. Floating rate notes 浮息利率票据中quoted margin和required or discount margin之间的关系

If credit quality of issuer decreases, quoted margin < required margin, and FRN will sell at a discount to its par value;

If credit quality of issuer improved, quoted margin > required margin, and FRN will sell at a premium to its par value;

**这里的quoted margin类似于coupon rate，required margin类似于discount rate。由于discount rate > coupon rate时，发行价格 < par value，所以才会有上面的比较关系。**

**Quoted margin + Libor = coupon rate;**

**Required or discount margin + Libor = discount rate (IRR)**

1. 计算money market yield—其中涉及概念包括bond equivalent yield（债券等价收益率-是折价债券的年收益率）, add-on yield (附加收益率)

Bond equivalent yield其实就是365天年化的add-on yield；

**Note例题page 48中计算出的holding period return (HPR)是360天年化的add-on yield；**

**本题第三问要求计算的yield是需要先算出实际年收益率effective annual yield (EAY), 所以当计算出HPR后，EAY就算出来了**。**注意半年的EAY不是简单的除以2;**

1. **根据forward rate计算spot rate或者根据spot rate计算forward rate**

**计算原理：比如S1,S2,S3代表1年，2年，3年的spot rate，计算债券价值用: PMT/(1+S1) + PMT/(1+S2)2 + PMT/(1+S3)3 = Par value 详见note page 50;**

**必要知识点和公式：**

1y1y: is the rate for a 1-year loan one year from now;

2y1y: is the rate for a 1-year loan to be made two years from now;

3y2y: is the rate for a 2-year loan of forward rate to be made three years from now;

第一个y代表起始时点，第二个y代表时长

**Spot rate & forward rate之间的关系：比如spot rate S3 代表 compounded rate for three years**

(1+S3)3 = (1+S1) \* (1+1y1y) \* (1+2y1y) 或者 S3= 【(1+S1) \* (1+1y1y) \* (1+2y1y)】1/3 -1

其中S代表spot rate, yy代表forward rate;

2y2y= 【(1+S4)4/ (1+S2)2】1/2-1

公式推导如下：

1+ 2y2y= 【(1+3y1y) \* (1+ 2y1y)】1/2

=【(1+S4)4/ (1+S3)3 \* (1+ S3)3/ (1+S2)2】1/2

= 【(1+S4)4/ (1+S2)2】1/2

**计算bond value using forward rate & spot rate 详见note page 55例题，很经典；**

**注意S1,S2,S3,S4是对应每一期的IRR， Note后面的练习题No 15也是很经典的例题；**

1. **不同类型Interest rate of mortgage**

* Fixed-rate mortgage: interest rate unchanged over the life of mortgage;
* Adjustable-rate mortgage or variable-rate mortgage: interest rate changed over the life of mortgage;
* Index-referenced mortgage: interest rate changed based on market determined reference rate such as U.S. Treasury bill rate;
* Hybrid mortgage混合抵押贷款: if interest rate becomes an adjustable-rate mortgage after the initial fixed-rate;
* Rollover or renegotiable mortgage 转期或可再协商抵押贷款: interest rate changed to different fixed rate after the initial fixed-rate;
* Convertible mortgage: 在adjustable 和fixed interest rate之间转换；
* **Mortgage pass-through securities 抵押转手证券**：持有者将若干抵押贷款打包形成一个抵押贷款池，并以此标的资产作为抵押物发行债券

1. Asset-backed security 知识点：

* Non-resource loans无追索权贷款：指一旦抵押价值贬值，低于原先的贷款价值，lender没有权利再要求额外的补偿；

Resource loans有追索权贷款：指一旦抵押价值贬值，低于原先的贷款价值，lender有权利再要求额外的补偿；一般在欧洲大部分都是有追索权的抵押，美国则是分州；

* Credit tranching 信用分组：按信用分为主次级结构—senior tranches & subordinated tranches A/B; 针对any losses, tranche B首先吸收，吸收完后tranche A再吸收，最后是senior tranche，它的信用也是最好的；
* Extension risk & contraction risk收缩风险: 背景是由于agency MBS 没有prepayment penalty, 可以提前还款以减轻利息的压力

Extension risk: prepayment will be slower than expected;

Contraction risk: prepayment will be more rapid than expected;

* Single monthly prepayment rate (SMM)每月提前清偿率：衡量每月提前还款速度；

Conditional prepayment rate (CPR)条件提前偿还率：年化提前还款指标；

* **系列支付层级 (sequential-pay tranches)**

设计特点是第一层级的证券本金得到优先偿付，等此层级的全部本金偿付完毕后，第二层及的本金才可以开始偿付；

**在较优先层级的证券得到本金与利息偿付的同时，较劣后层级的证券可以得到利息支付；**

**需要会根据图示识别prepayment risk在PAC 和 support tranche之间哪个风险大，详见note page 83-84**

* **Commercial mortgage-backed securities (CMBS): are backed by income-producing real estate. It is structured as nonrecourse loans，相对应的residential mortgage 有追索权；所以对于CMBS的分析，集中在the credit risk of the property and not the credit risk of the borrower;**

**CMBS call protection: 赎回保护：贷款池里有不同档的贷款，按照priority分级；这个是CMBS 和RMBS的最大区别 （CMBS才有的特征）**

* **Debt-to-service-coverage ratio (DSC) = net operating income / debt service**

**分子代表commercial property generate income的金额，分母是此commercial property需要偿还贷款的金额，所以比率越高，说明还贷能力越强；**

* **Loan-to-value ratio = current mortgage amount / current appraised value: compare the loan amount on the property to its current fair market or appraisal value**

**The lower the better for this ratio from the perspective of the lender and the MBS investor;**

* **Auto loan ABS: 一般分档来规避风险；**
* **Credit card ABS: 有lockout period，在此期间只付利息，不付本金；**
* **Collateralized debt obligation债务抵押债券 or CDO is backed by an underlying pool of debt securities。 Both collateralized mortgage obligations不动产抵押担保债券 and commercial mortgage-backed securities are backed by mortgages only.**

1. **Fixed-rate bond with different YTM after purchased:**

|  |  |
| --- | --- |
| 到期收益率保持不变(YTM不变) | 到期收益率发生变动 (YTM变动) |
| 1. 持有至到期，HPR= YTM; 2. 到期前出售，HPR=YTM; | 持有至到期，if YTM & reinvestment rate increase, HPR>YTM  at purchased; if decreased, HPR< YTM at purchased; 持有时限大于卖完剩余到期期限，if YTM & reinvestment rate increased, HPR< YTM at purchased; if decreased, HPR> YTM at purchased; 持有时限小于卖完剩余到期期限，if YTM & reinvestment rate increased, HPR< YTM at purchased; if decreased, HPR> YTM at purchased; |
|
|

**Short investment horizon: market price risk > reinvestment risk** 因为holding period 短，主要受interest rate 影响，reinvestment risk 因为持有期短，几乎没有影响。Increase in yield decreased the rate of return over the one-year holding period because the sale price is lower;

**Long investment horizon: reinvestment risk > price risk** 因为holding period 长，reinvestment risk占主导因素；

**更多解释详见note page 100**

1. **计算HPR：**

**例题：假设9年的债券，7% annual coupon bond, its yield to maturity increases to 8% after purchased bond and before first coupon is received. The investor sells the bond after five years, assumed the yield to maturity remain at 8% and all coupon are reinvested over the 5-year holding period. 计算5-year horizon yield**

**思路：计算持有5年卖之前的PV & reinvestment interest 之和，再利用公式**

**[(PV + reinvestment interest) / 最开始买bond的PV ] 1 /hold years -1**

回到例题： 持有5年卖之前的PV : N=4 (9-5), FV=100, I/Y=8, PMT=7 (此金额不变，随初始买债券时候的coupon bond走，因为合同已经签了，按合同付利息)，求得5年卖之前的PV = 96.68；

Reinvestment interest: N=5, I/Y=8, PMT=7, PV=0 (因为刚买，没有利息收入), 求得 `ment interest FV= 41.07;

所以HPR = [(41.07 + 96.68) /100] 1/5 -1 =6.62%

1. **Duration 久期：是债券的全价对债券的到期收益率或基准利率变动的敏感性；可分为收益率久期 (yield duration) 和曲线久期 (curve duration)**

* **Macaulay Duration:** 是指收到本金和利息所需要的加权平均时间，权重是每笔现金流的现值占债券全价的比重；
* **Modified Duration:** provide an approximate percentage change in a bond’s price for a 1% change in yield to maturity;

Approximate percentage change in bond price = -ModDur \* YTM的变化值

**For an annual pay bond: ModDur= MacDur/ (1+ YTM)**

**For a semiannual-pay bond with a YTM quoted on a semiannual bond:**

**ModDur semi = MacDursemi / (1+ YTM/2)**

* **Approximate modified Duration = (V- - V+) / (2\*V0\*YTM的变化值)**
* **Effective Duration 有效久期：**描述的是债券价格相对于基准收益率曲线平行移动的百分比变动，可用于衡量含有内嵌期权债券的利率风险，比如callable bond or a mortgage-backed bond;

**Effective modified Duration = (V- - V+) / (2\*V0\*curve的变化值)**

* **Modified duration makes no distinction between changes in the benchmark yield and changes in the spread.**
* **Key rate duration:** 主要针对收益率曲线的非线性位移对债券价格的影响。它是根据interest rate变化一段一段的计算，然后总和；
* **Other things equal:**

1. **Bond’s maturity increases, will increases its interest rate risk;**
2. **Coupon rate increases, will decrease its interest rate risk;**
3. **Bond’s YTM increases, will decrease its interest rate risk;**

* **货币久期 (money duration)：**描述的是债券价格相对于收益率变动所产生的**金额**变动；

Money duration= annual modified duration \* full price of bond position;

其中full price of bond = par value of bond \* 指数， 例如指数= full price of 101, $2 million par value, full price = 101 \* 2 million

**Or 计算per 100 of bond par value:**

Money duration per 100 units of par value = annual modified duration \* full bond price per 100 of par value

**Full bond price per 100 of par value 是排除par value of bond---例如2 million, 只是乘以指数**

**基点价值 (price value of a basis point):** 计算债券到期收益率变动1个基点 (1bp)时全价的变动，和货币久期相似；

**注意是每1bp 增加，对应全价降低的值，对应的公式：**

**PVBP(price value of a basis point)= (V-- V+) /2 = 货币久期 \* 0.0001**

**V- : 是YTM下降1bp时的全价；**

**V+：是YTM上升1bp时的全价；**

1. **久期和凸性：**

**久期是一个时间概念，是到期收益率的减函数**；

债券的久期越大，利率的变化对该债券价格的影响也越大，因此，该债券所承担的利率风险也越大。在降息时，久期大的债券价格上升幅度较大；在升息时，久期大的债券价格下跌的幅度也较大。因此，投资者在预期未来降息时，可选择久期大的债券，在预期未来升息时，选择久期小的债券；这就是久期的双面性。

久期越长，债券基金的资产净值对利息的变动越敏感：假设某债券的久期是5年，那么利率下降1个百分点，则基金的净值约增加5个百分点，反之净值则下降5个百分点。

**凸性：**就是收益率每变化1个百分点，所引起的久期的变化程度。间接表明债券价格对收益率变动的敏感程度的指标。

**当凸性为正时，债券价格会随着利率不断上升而下跌，且跌幅不断变小；或者随着利率不断下跌而上升，且升幅不断变大。**

**当凸性为负时，债券价格会随着利率不断上升而下跌，且跌幅不断变大，或者随着利率不断下跌而上升，且升幅不断变小。**

凸性具有单面性，就是凸性越大，债券的风险越小。

1. **Duration gap = Macaulay Duration – investment horizon**

A positive duration gap (Macaulay duration > the investment horizon) expose investor to market price risk from increasing interest rates; 也就是market price risk > reinvestment risk

A negative duration gap (Macaulay duration < the investment horizon) expose investor to reinvestment risk from decreasing interest rates; 也就是market price risk < reinvestment risk，反过来reinvestment risk高的话，不会产生利率变高的效果；

1. **通过修正久期，YTM的变化值和凸性计算full price of bond的变化**

Change in full bond price = -annual **modified** duration \* YTM的变化值 + 0.5 \* annual **convexity** \* YTM变化值的平方 至于加上凸性部分，则参考page 111的手写说明

注意如果只给出convexity 和YTM的变化值，就= 0.5 \* annual convexity \* YTM变化值的平方，也就是说只算后半部分即可；同理，只给出前半部分的值—modified duration & YTM的变化值的平方，也就只算前半部分；

详见note page 111例题

1. **Approximate Convexity近似凸性= (V- + V+ -2V0) / (YTM变化值)2＊V0**

**Approximate effective convexity = (V- + V+ -2V0) / (curve变化值)2＊V0**

1. 影响久期的因素：

* 票面利率越高，久期越低；
* YTM越高，久期越低；
* 一般来说，到期期限越长，久期越高；
* Embedded option的存在，会降低久期；

1. Reinvestment risk VS market price risk



1. 收益率利差 (yield spread)= 流动性溢价 (liquidity premium) + 信用利差 (credit spread)

信用等级越低的债券通常其收益率利差的波动性越大；

利差越小，表明情况越好，比如经济情况走强，经纪人和交易商的资本增加等等；

Bond prices and credit spreads change much faster than credit ratings—是指credit rating 滞后性；

Firm-specific risks are difficult to rate;

1. Corporate family ratings (CFR)发行人评级：是针对发行人的整体信用，是所有债务的平均信用；

Corporate credit ratings (CCR)发行评级：是针对某一次具体债务发行的评级；

1. **Leverage ratio:**

**EBITDA= operating income + depreciation + amortization**

**FFO (funds from operations) = net income + depreciation + amortization + deferred taxes + noncash items**

**FCF before dividends =net income + depreciation + amortization – capital expenditures – increase in working capital 亦或是= cash flow from operations-capital expenditures- increase in working capital**

**FCF after dividends = FCF before dividends- dividends**

1. **Futures contracts differ from forward contracts:**

* Futures contracts trade on organized exchanges. Forwards are private contracts and typically do not trade;
* Futures contracts are standardized. Forwards are customized contracts satisfying the specific needs of the parties involved;
* A clearinghouse is the counterparty to all futures contracts. Forwards are contracts with the originating起源 counterparty and therefore have counterparty (credit) risk;
* The government regulates futures markets. Forward contracts are usually not regulated and do not trade in organized markets;
* **Forwards 进行实物交割，性质类似 “一手交钱，一手交货”；futures 和options在场内交易，即交易所内交易；**
* **Swap contracts: one party pays a floating rate and the other party pays a fixed rate.** At each payment date the difference between the swap fixed rate and Libor is paid to the party that owes the least, that is, a net payment is made from one party to the other.

1. Long call: the buyer of a call option—has the right to buy an underlying asset;

Short call: the seller of a call option—has the obligation to sell the underlying asset;

Long put: the buyer of a put option—has the right to sell the underlying asset;

Short put: the seller of a put option—has the obligation to buy the underlying asset;

Forwards contracts, futures contracts, and swaps are all forward commitments;

Options and credit derivatives (or called as credit default swap) are contingent claims--或有求偿权，指未来可以兑现的或者求补偿的；

1. **Futures prices VS forward price**

* **Futures gains and losses are settled each day and the margin balance is adjusted accordingly; forwards do not require or provide funds in response to fluctuations in value during their lives;**
* **A positive correlation between interest rates and the futures price means that daily settlement provides funds (excess margin) when rates are high and they can earn more interest, and requires funds (margin deposits) when rates are low and opportunity cost of deposited funds is less. 由于这个原因，当利率和future prices正相关时，futures prices > forward prices；当利率和future prices负相关时，futures prices < forward prices；**

1. Maintenance margin:

* **For a futures account**: if the margin balance in the account falls below the maintenance margin, additional funds must be deposited to **bring the margin balance back to the initial margin amount;**
* **For equity account, bring the margin backup to the maintenance margin amount;**

1. **Price and value of forward contract知识点**

* If stock’s price is 40 at expiration, Stock + put = call + 40/(1+Rf)T T: 如果是一年的话就是1，半年就是0.5
* **The forward price远期价格 is fixed at the start, and the value starts at zero远期价值开始是零 and then changes; 远期价值是到期日现价 – 远期价格的差额**
* VT (T) = ST -F0 (T) : VT是远期合约在到期日的价值（差额），ST是资产在到期日的现货价格，F0 (T)是合约的远期价格；此公式是指对多方而言，对于空方，则是VT (T) = F0 (T) -ST
* V0 (T) =0, 远期合约在初始日的价值为零，因为差额是在合约到期时由付款产生；
* F0(T) = S0\* (1+Rf)T 远期价格等于现货价格在合约期限内使用无风险利率计算的终值；
* PV0 (Cost)是hold the asset的成本； PV0 (benefit)是hold period的便利收益；

**If no benefits，有hold asset cost, total cost = [S0 + PV0 (cost)] (1+ Rf) T**

**If no cost，有benefit, total cost = [S0 - PV0 (benefit)] (1+ Rf) T**

如果既有cost又有benefit，**F0 (T)= [S0 + PV0 (cost) – PV0 (benefit)] \*(1+Rf)T**

在到期前某一时点t,

**Vt (T)= St + PVt (cost) – PVt (benefit) – F0(T)/ (1+ Rf)T-t**

到期时，T-t=0, 则Vt (T)= St - F0(T)

1. **In the money(行权有利可图)/ out of the money(不利于行权)/ at the money**

**S: the price of underlying asset; X: the exercise price of the option;**

**在call option 条件下：**

In the money call options: S – X > 0 buying a share for X and selling it in the market for a greater price S;

Out of the money call options: S – X < 0;

At the money call options: S = X;

**在put option 条件下：**

In the money put options: X – S > 0 buying a share for S and exercising the put to receive X for the share;

Out of the money put options: X – S < 0;

At the money put options: S = X;

**在fiduciary call VS protective put的对比下：**

If S > X:

The protective put payoff is S, and fiduciary call also payoff is S;

If X > S:

The protective put payoff is X, and fiduciary call also payoff is X;

两者都是选最贵的，而且两者都相等

Put-call parity:

Long call + long bond = long asset + long put

演化成： Call + X/(1+Rf)T = S +Put

X是行权价格，S是asset at expiration的价格

如果设计远期forward, 由于F0(T) = S0\* (1+Rf)T，则公示演变为 Call + X/(1+Rf)T = F0(T)/(1+Rf)T +Put

Note that the options must be European-style and the puts and calls must have the same exercise price and time to expiration for these relations to hold

1. 6 factors determine option prices

**与call option 成正比，并与put option 成反比的因素有：**

* **Price of the underlying asset;**
* **Risk-free rate of interest;**
* **Costs of holding the asset**

**与put option 成正比并于call option 成反比的因素有：(exercise price 是买入价格，当卖出价格不变时，买入价格越高，the value of call option就越低)**

* The exercise price: higher exercise price decreases call option value and increases put option;
* **Benefits of holding the asset**: when a stock pays a dividend, or a bond pays interest, decreases in the value of the underlying asset decrease call value and increase put value;

**与 call option和put option 都成正比的因素有：**

* Volatility of the underlying
* **Time to expiration**: 但是由于存在货币的时间价值, 致使未来到期按照行权价格卖出标的资产的收入, 其现值会降低，从而降低期权的价值，距离到期时间越长，负面影响越明显

1. **Hedging the underlying with a derivative 套期保值：**

套期保值就是对冲，需要2个市场（现货和另外一个市场）来说。A和B商量好月末A卖给B一个苹果，价格按照月末的市场价格。 比如说A的苹果成本为8元。A担心苹果价格月末降的太多（降到7元就赔本了），而现在市价（现货价和期货价同方向变动）是9元，他需要保证获利，这样他先在期货市场卖1个月末的苹果（A在期货市场上卖1个苹果，期货市场上的C认为苹果月末会涨价于是买A的1个苹果合约），同时拿着苹果等待月末和B去交易。   
 月末 苹果市价为 7元 那么：B赚了2元 C陪了2元 A：赚1元（现货陪2元，期货赚2元）  
 月末 苹果价格为11元 那么：B赔了2元 C赚了2元 A：赚了1元（现货转了2元，期货赔了2元）

就结果看：套期保值是为了保证A能赚1元的利润，能避免害怕出现的风险（苹果价格下跌倒成本价格一下）但是也丧失了能赚取额外收益的机会（苹果价格上升）   
 所以说套期保值只能由有现货背景的企业来操作

1. **看跌看涨期权平价关系 (put-call parity):** 持有标的资产的同时买入看跌期权，会形成一种投资组合，即保护性卖权（protective put），而买入看涨期权的同时买入无风险债券则会形成另一种投资组合，即信托性买权（fiduciary call）

**注意四种变化方式的等式，每个等式都会相应地出现short call or bond or asset or put**

**C0 + X/ (1+ Rf)T =S0 + P0  long call + long bond = long asset + long put 也说明了在到期之前，market value of option 大于 exercise value，因为S旁边是Put，exercise value旁边是call;**

看跌-看涨远期平价 (put-call forward parity): **是用forward contract 替代underlying asset**

C0 + X/ (1+ Rf)T =**F0(T)/ (1+Rf)T**+ P0 which is put-call forward parity at time 0

重新安排等式：【X- F0(T)】/ (1+ Rf)T = P0 – C0

1. FRA (forward rate agreement): a firm intends to borrow in the future can lock in an interest rate with a long position in an FRA; 因为会收到利息差额根据FRA协议；

A firm intends to lend in the future can lock in an interest rate with a short position in an FRA; 因为会收到利息差额根据FRA协议；

1. European and American options

For a call option, if asset pays cash flow during the life of a call option, early exercise can be valuable and American call option will be priced higher than an otherwise identical European call option;

For put option, early exercise can be valuable when the options are deep in the money and

American call option will be priced higher than an otherwise identical European call option;

**美式期权和欧式期权的区别**

**区别主要在执行时间上  
美式期权合同在到期日前的任何时候或在到期日都可以执行合同，结算日则是在履约日之后的一天或两天，大多数的美式期权合同允许持有者在交易日到履约日之间随时履约，但也有一些合同规定一段比较短的时间可以履约，如“到期日前两周”。   
欧式期权合同要求其持有者只能在到期日履行合同，结算日是履约后的一天或两天。目前国内的外汇期权交易都是采用的欧式期权合同方式。**

1. **Long call/ short call/ long put/ short put---详见note 例题page 193 以及page 197的总结**

看涨期权是买入权，看跌期权是卖出权。期货可以用来锁定收益和降低风险，买入看涨期权就是希望标的物价格上涨，例如未来以50元的价格成交的货物涨到60元，根据期货合约，你任然可以以50元价格买入，再以60元价格卖出，盈利10元。卖出看涨期权是将买入看涨期权的权利让渡给别人，这时候你当然不希望50元的标的物价格上涨，上涨多少你亏多少，但是当标的物价格低于50元，别人不会以低于50元的价格卖50元的东西，所以别人放弃行权，你赚取期权费。

反之，看跌期权【认沽权证】是卖出权，你就希望以高于市值的价格卖掉手中货物，这时候你赚取。当你买入看跌期权，当50元的标的物降到40元，你有看跌期权，你可以行权，赚10元差价。卖出看跌期权就是不希望货物价格下跌，这样别人就不能以低价买你手中高价商品，比如50元的标的物价格上涨到60元，看跌期权执行价50元，你的看跌期权的持有人不会以50元的价格卖出60元的东西，他放弃行权，你赚取期权费。  
**总的来说，买入看涨期权就是希望它涨，涨越多你赚越多，卖出看涨期权就是不希望他涨，你赚取期权费；买入看跌期权就是希望它跌，跌了你就可以用高价卖出市值低于出售价的商品，卖出看跌期权就是希望它涨，涨了别人就不会高价卖给你低廉的东西，你赚取期权费。**

1. Alternative investment知识点

* Two types of LBO (Leveraged buyouts)

**Management buyouts (MBOs):** the existing management team is involved in the purchase; 现有的管理层加入到收购中；

**Management buy-ins (MBIs):** an external management team will replace the existing management team;

* **Timberland & farmland are considered as real estate;**
* **Appraisal index returns are smoother than those based on actual sales and have the lowest standard deviation of returns of the various index methods;**
* **Brownfield investments 褐地投资：**infrastructure assets already constructed; provide stable cash flows and relatively high yields, but offers little potential for growth;

**Greenfield investments 绿地投资 ：** infrastructure assets are to be constructed; more uncertainty and provide relatively lower yield, but offers greater growth potential;

* **Hard hurdle rate 硬性收益门槛：incentive fees are earned only on returns in excess of the benchmark; 激励费只有在收益率超出门槛回报率后，才能以超出部分作为收费基础；**

**Soft hurdle rate 温和型收益门槛： incentive fees are paid on all profits, but only if the hurdle rate is met; 激励费只有在收益率超出门槛回报率后，才能以全部利润作为收费基础；考试如果没有标注是硬性还是温和型，一律用硬性；**

* **High water mark: 激励费仅在投资者账户的累计回报高于此前记录的最高值时才可以收取；**
* **Note Page 214 例题**
* **Note page 216例题 利用company comparable approach 来对private equity company 估值**
* **Leveraged buyouts and venture capital are the two dominant strategies;**
* Historically, real estate returns are highly correlated with global equity returns but less correlated with global bond returns;
* Downside risk 下偏风险的计量：标准差的使用无法有效计量；

Value at risk 风险价值和索丁诺比率可以有效计量；

* 投资者净回报率= （期末价值- 期初价值-收取的管理费与激励费）/期初价值

如果管理费是在年末计算，则incentive fee= (期末价值- 期初价值) \* charge%

* Commodities 经常涉及到远期合约，不动产和抵押品很少涉及衍生产品；
* Standard deviation is not an appropriate measure of risk for hedge fund，因为risk会被低估。 不过可以通过estimate value to calculate returns;

Publicly traded REITs 和 exchange-traded funds倒是可以通过标准差来衡量风险；

* Roll yield 滚动收益is positive for a market in **backwardation** (futures price < spot price) and negative for a market in **contango** (futures price > spot price)
* Alternative investments that reply on estimates rather than observable market prices for valuation purposes are most likely to report returns that are understated.

Because the use of estimates tends to smooth the return series. As a consequence, the volatility of returns will be understated.

* Future price = spot price \* [(1 + r) + storage cost – convenience yield]

所以当future price < spot price时，convenience yield 大于storage cost

43.



43投资各阶段特征：

1. Formative-stage financing

a. Angel investing is capital provided at the idea stage. Fund may be used to transform the idea into a business plan and to assess market potential.

b. Seed-stage financing or seed capital generally supports product development and/or marketing efforts, including market research.

c. Early stage financing (early stage venture capital) is provided to companies moving toward operation but before commercial production and sales have occurred.

2. Later stage financing is provided after commercial production and sales.... but before any IPO

3. Mezzanine-stage financing is provided to prepare to go public and represent the bridge between the expanding company and the IPO.

1. The benefits of derivatives markets are that they :
2. Provide price information;
3. Allow risk to be managed and shifted among market participants;
4. Reduce transactions costs
5. 杂点

* 易错题： note page 17-4, page 30-4/5/9, page 61-5/12/15, page 92-8, page 119-7/10/13, page 186-1/2/4/5/9, page 198-5/8, page 225-10