**Chapter 5 – Factors Affecting Bond Yields and The Term Structure Of Interest Rates**

1. **Following are U.S. Treasury benchmarks available on December 31, 2007:**

**US/T 3.125 11/30/2009 3.133**

**US/T 3.375 11/30/2012 3.507**

**US/T 4.25 11/15/2017 4.096**

**US/T 4.75 02/15/2037 4.518**

**On the same day, the following trades were executed:**

|  |  |  |
| --- | --- | --- |
| **Issuer** | **Issue** | **Yield (%)** |
| **Time Warner Cable Inc.** | **TWC 6.55 05/01/2037** | **6.373** |
| **McCormick & Co. Inc.** | **MKC 5.75 12/15/2017** | **5.685** |
| **Goldman Sachs Group Inc.** | **GS 5.45 11/01/2012** | **4.773** |

**Based on the above, complete the following table:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Issue** | **Yield (%)** | **Treasury Benchmark** | **Benchmark****Spread (bps)** | **Relative Yield****Spread** | **Yield Ratio** |
| **TWC 6.55 05/01/2037** | **6.373** |  |  |  |  |
| **MKC 5.75 12/15/2017** | **5.685** |  |  |  |  |
| **GS 5.45 11/01/2012** | **4.773** |  |  |  |  |

Benchmark Spread:

TWC: 6.373% – 4.518% = 1.855%

MKC: 5.685% – 4.096% = 1.589%

GS: 4.773% – 3.507% = 1.266%

Relative Yield Spread:

TWC: (6.373% – 4.518%) / 4.518% = 41.085%

MKC: (5.685% – 4.096%) / 4.096% = 38.794%

GS: (4.773% – 3.507%) / 3.507% = 36.099%

Yield Ratio:

TWC: 6.373% / 4.518% = 1.41058

MKC: 5.685% / 4.096% = 1.38794

GS: 4.773% / 3.507% = 1.36099

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Issue | Yield (%) | Treasury Benchmark | BenchmarkSpread (bps) | Relative YieldSpread | Yield Ratio |
| TWC 6.55 05/01/2037 | 6.373 | **4.518** | **1.855** | **41%** | **1.41** |
| MKC 5.75 12/15/2017 | 5.685 | **4.096** | **1.589** | **39%** | **1.39** |
| GS 5.45 11/01/2012 | 4.773 | **3.507** | **1.266** | **36%** | **1.36** |

1. **The yield spread between two corporate bond issues reflects more than just differences in their credit risk. What other factors would the spread reflect?**
* Term or maturity of the issue
* Embedded options
* Taxability of interest
* Expected liquidity of the issue
1. **Why is an option-adjusted spread more suitable for a bond with an embedded option than a yield spread?**

The interest earned on a taxable bond relative to a similar maturity treasury bond (the spread to treasuries) includes credit risk premium, the liquidity premium, and any adjustments for optionality. Recall if the option is granted to the issuer (a call option), the yield is greater and if the option is granted to the holder (convert option or put option) the yield is smaller.

Generally the liquidity premium is small (relative to the credit premium) to the intent of the Option Adjusted Spread (OAS) is to remove from the market spread the effects of optionality in order to better measure the credit premium.,

1. **Suppose a client observes the following spreads for two bonds:**

**Bond issue U rated A: 150 basis points**

**Bond issue V rated BBB: 135 basis points**

**Your client is confused because he thought the lower-rated bond (bond V) should offer a higher benchmark spread than the higher-rated bond (bond U). Explain why the benchmark spread may be lower for bond U.**

Since the lower rated bond (bond V) has the smaller spread it is reasonable to infer one or more of the following:

* Bond U, the higher rated bond, is callable. A call option is granted to the issuer so the holder is compensated with a higher yield.
* Bond V, the lower rated bond is putable or convertible. A put option or convert option is granted to the holder so the issuer can pay a lower yield.
* The yield curve is very steep and Bond V is much “shorter” than bond U.
1. **In the May 29, 1992, *Weekly Market Update* published by Goldman, Sachs & Co., the following information was reported in an exhibit for high-grade, tax-exempt securities as of the close of business Thursday, May 28, 1992:**

|  |  |  |
| --- | --- | --- |
| **Maturity (years)** | **Yield (%)** | **Yield (%) as a Percentage of Treasury Yield** |
| **1** | **3.20** | **76.5** |
| **3** | **4.65** | **80.4** |
| **5** | **5.10** | **76.4** |
| **10** | **5.80** | **78.7** |
| **30** | **6.50** | **82.5** |

**Answer the below questions.**

1. **What is meant by a tax-exempt security?**

The holder of a tax-exempt security does not have to pay certain income taxes on the income from the coupon income form the bond. Income earned by qualified buyers of municipal bond issues are exempt from federal taxes.

The tax-exempt aspect can affect the spread. For example, part of the spread between Treasury securities and taxable non-Treasury securities of the same maturity reflects the value of the exemption from state and local taxes.

1. **What is meant by high-grade issue? Bonus: What is meant by high-yield issue?**

High-grade means low credit risk so lower coupon rates and YTMs.

High grade bonds have AAA, AA and A credit ratings.

High-yield means high credit risk so high coupons and high YTMs.

High yield bonds have ratings BB and below.

1. **Why is the yield on a tax-exempt security less than the yield on a Treasury security of the same maturity?**

The yield on a tax-exempt security is less because investors are exempt from certain taxes (e.g., federal, state, or local).

1. **What is the equivalent taxable yield?**

The yield that must be on a taxable bond that gives the same after-tax yield as a tax-exempt issue.

Equivalent Taxable Yield = (Tax-Exempt Yield)/(1 – Marginal Tax rate)

1. **Also reported in the same issue of the Goldman, Sachs report is information on intra-market yield spreads. What are these?**

An intra-market yield spread is the spread between two issues within a market sector. Examples of market sectors include the U.S. government, U.S. government agencies, municipal governments, credit (domestic and foreign corporations), and foreign governments.

1. **Answer the below questions.**
2. **What is an embedded option in a bond?**

A clause in a bond contract that includes a provision giving either the bondholder and/or the issuer the option to require action of the other party.

1. **Give three examples of an embedded option that might be included in a bond issue.**
2. A ***callable*** bond allows the issuer to buy back the bond from the holder at a designated price and time.
3. A ***convertible*** bond allows the holder to convert to the bond to the common stock of the issuing company.
4. A ***putable*** bond allows the holder of the bond to sell the bond back to the issuer at a designated time and price. Put options usually have a trigger - meaning the bond is only putable if the company engages in a prohibited action such as selling specific assets or dramatically changing the asset/liability structure. A put option, which would require the company to pre-pay debt, is often a deterrent to the stated action.
5. **Does an embedded option increase or decrease the risk premium relative to the base interest rate? (Poorly textbook written question. Try this instead: Does an embedded option increase or decrease the *spread* relative to the base interest rate?)**
* An option granted to the issuer (a call option) increase the spread.
* An option granted to holder (a put option or a convert option) decreases the spread.
* The option adjusted spread (OAS) attempts to remove the effect of the option and leave jus the risk premium (and maybe a small liquidity premium).
1. **Answer the below questions.**
2. **What is *a* yield curve? Bonus question: What is *THE* yield curve?**

*A* yield curve is the graphical depiction of the relationship of the YTM on bonds of the same credit quality across different maturities.

*The* yield curve is the same thing for on-the-run Treasury bonds.

1. **Why is the Treasury yield curve the one that is most closely watched by market participants?**

It represents the best measure of the true time value of money:

* Treasury securities are free from default risk so there is no risk premium in YTM.
* Since there is no default risk there is no difference in credit quality bonds of different maturities.
* The US Treasury market is the largest and most active bond market so the YTM contains no (or at least the smallest) liquidity premium and is least likely to show a “stale” price.
* Note that there may be a yield premium at the long-end of the curve to compensate for increased interest rate risk (duration).
1. **What is a spot (zero) rate?**

The spot zero rate for a given maturity is the yield on a theoretical zero-coupon Treasury contracted today (in the spot market - as opposed to the futures market). The graphical depiction of the relationship between spot rates of different maturities is called the spot rate curve (or the spot zero curve).

1. **Explain why it is inappropriate to use one yield to discount all the cash flows of a financial asset.**

Cash flows received at different points in time should be discounted at a rate appropriate to the time when cash flow is received.

A financial asset (a bond) can be separated into a series of individual cash flows. Each of these individual cash flows is priced using a discount rate appropriate to the timing of the cash flow.

If the series of cash flows that make up a bond can be purchased individually for less than the price of the bond, then an arbitrageur will buy the individual cash flows and sell the bond until the purchase and sale market activities equate the price of the individual cash flows to the bond.

Alternatively, if the series bond can be purchased for less than the cost of the individual cash flows that make up a bond, then an arbitrageur will buy the bond and sell the individual cash flows until the purchase and sale market activities equate the price of the bond to the individual cash flows.

Therefore a price difference cannot exist in equilibrium. Since time-varying discount rates are used to price the individual cash flows, and the price of the individual cash flows must equal the price of the bond, time-varying discount rates must be used to price the bond.

1. **Explain why a financial asset can be viewed as a package of zero-coupon instruments.**

Another way to ask Question 9. See the answer above.

1. **How are spot (zero) rates related to forward rates?**

Forward rates and spot (zero) rates are related because a forward loan (a commitment today to either lend or borrow in the future) can be replicated using a series of spot loans (loans made today).

Therefore, since a series of *spot* loans can be used to replicate a *forward* loan, *spot* *rates* can be used to calculate *forward* *rates*. Using the arbitrage argument described in the answer to Question 9, if a security can be replicated by a package of other securities, then the price of the security and the replicating package must be equal. If not, an arbitrage exists.

Example: Borrow $100 today for three years and lend $100 today two years. This is equivalent to borrowing $100 in two years for one year – called a two-year forward, one-year loan. The rate on this loan is called the ***implied*** forward rate.

1. **What are the problems with using only on-the-run Treasury issues to construct the theoretical spot rate curve?**

There are large gaps between some of the maturity points in the on the run curve. One method for filling the gaps is linear interpolation for the missing maturities (which is what we will do), but this “straightens” the curve in between the missing points. Another method for filling the gaps is to use older bonds. But older bonds have a higher YTM (and therefore are priced lower) to compensate for the lower liquidity.

1. **What actions force a Treasury’s bond price to be valued in the market at the present value of the cash flows discounted at the Treasury spot rates?**

Arbitrage with STRIPS. Since all the cash flows of treasury can be replicated with a package of STRIPS, the price of a treasury must equal the price of the package of STRIPS.

1. **Explain the role that forward rates play in making investment decisions.**

Implied forward rates can be used by investors to lock-in future borrowing costs or lending revenues. Interest rate futures contracts or interest rate forwards (called forward rate agreements or FRAs) can be used in many ways including hedging bond potions.

1. **“Forward rates are poor predictors of the actual future rates that are realized. Consequently, they are of little value to an investor.” Explain why you agree or disagree with this statement.**

Although forward rates may have poor predictive value, the ability to lock-in borrowing or lending rates at some future time is a powerful tool for investors and other market participants.

1. **Answer the below questions.**
2. **What is meant by the swap rate?**

First: What are interest rate swaps and how are they used?

An interest rate swap is a series of agreements between two parties, one of which is usually a bank acting as a swap dealer. The two parties agree to exchange a fixed interest rate on a notional amount for a variable interest rate on the same notional amount.

For example, an corporation will enter into a swap agreement with an investment bank to pay to the bank 3.00% on $100 million each year for the next 5 years and receive from the bank LIBOR (a floating rate) on $100 million. At the time the contract is initiated, LIBOR will equal 3%. If LIBOR does not change, the corporation will owe 3% of $100 ($3) and be owed 3% of $100 ($3) so no exchange will take place.

If LIBOR increase to 4%, the corporation will still owe the fixed rate of 3% ($3) but be owed 4% ($4) so the bank pays the corporation $1.

If LIBOR decrease to 2%, the corporation will still owe the fixed rate of 3% ($3) but be owed 2% ($2) so the corporation pays the bank $1.

The corporation might enter into this swap to speculate on interest rates or (more likely) to hedge a floating rate bond that it has issued. The floating rate bond would require the corporation to make larger payments in a rising interest rate environment. These larger bond payments would be off-set by the proceeds from the swap.

The ***swap rate*** is the fixed interest rate that is paid by the fixed rate swap counterparty. Banks acting as swap dealers quote swap rates for different maturities.

1. **What is meant by the swap curve?**

The graphical relationship between swap rates and maturity of a swap is called the **swap rate yield curve** or, more commonly, the **swap curve**. Because the reference rate is typically LIBOR, the swap curve is also called the **LIBOR curve**.

1. **Explain whether you agree or disagree with the following statement: “A country’s swap curve is a default-free yield curve.”**

The swap rate yield curve (or swap curve or LIBOR curve) provides information about available borrowing and lending rates in a country and is used as an interest rate benchmark. Swaps are not default-risk free therefore the curve is not a default-free yield curve - it reflects the credit risk of the banks in that country acting as swap dealers.

Unlike a country’s government bond yield curve, the swap curve reflects the credit risk of the counterparty to an interest rate swap. Since the counterparty to an interest rate swap is typically a bank (or “bank-related entity”) the swap curve reflects the average credit risk of representative banks that provide interest rate swaps.

1. **Why do market participants in some countries prefer to use the swap curve (as the base interest rate curve) rather than the government bond yield curve (as the base interest rate curve)?**

In many countries, market participants use the country’s swap curve as the benchmark interest rates rather than the country’s government bond yield curve.

There may be political, legal or technical reasons why the rate paid on a government’s bonds may not be representative of true market-forces interest rates. Second, a government needs to have many debt issues to create a useful curve. In recent years the liquidity (market activity) of the interest rate swaps in many currencies has increased to the point where swaps are often a much more liquid and more market-determined interest rate market with fewer maturity gaps than the market for government bonds.

The increase in liquidity and the lack of maturity gaps has led to the rise in the popularity of the swap curve in the US market.

1. **A client observes that a corporate bond that he is interested in purchasing with a triple A rating has a benchmark spread that is positive when the benchmark is U.S. Treasuries but negative when the benchmark is the LIBOR curve. The client asks you why. Provide an explanation.**

The rates on the LIBOR curve (aka the swap curve) reflects more default risk than the U.S. Treasuries benchmark curve which is a default-free yield curve. The LIBOR curve reflects the credit risk of the banks acting as swap dealers. It is possible that the credit risk of banks can exceed the credit risk of AAA-rated corporations. Note that this happened is the summer and fall of 2007.

**Extra Questions:**

1. **Describe the term structure (aka yield curve) theories.**

The point behind term structure theories (also known as yield curve theories) is to think about what market forces determine the price and yield of current bonds. From the YTM’s on current we can bootstrap theoretical zero-coupon (“spot zero”) rates. The theoretical spot zero rates give us implied forward rates – rate that can be locked in today. Market participants can profit if realized rates in the future differ from the forward rates.

So the question is this:

Since the price and yield of current bonds gives spot zero rates and spot zero rates gives forward rates, how much are market participants thinking about what rates will be in the future when they price current bonds?

Another way to say it is this:

Are current bond prices and yields related to expected rates in the future?

1. **Expectations Theory**

The forward rates implied by the current prices and yields of bonds are closely related to the market’s expectations about rates in the future.

1. **Pure Expectations Theory:**

Current prices and yields (and therefore implied spot rates and implied forward rates) exclusively represent the expected future rates. There are no “biases” (other factors) in the yields of current bonds.

1. **Biased Expectations Theory:**
2. **Liquidity Theory:**

Implied forward rates are not an *unbiased* estimate of the market’s expectations of future interest rates because some of the yields on current bonds include a liquidity premium. So current yields reflect expectations *plus* a liquidity premium of varying size.

1. **Preferred Habitat Theory:**

Implied forward rates are not an *unbiased* estimate of the market’s expectations of future interest rates because prices of current bonds (and therefore the yields) are affected by variations of supply and demand for specific maturities.

For example, market participants may buy ten-year bonds and not buy seven-year bonds because of the timing of associated liabilities. Therefore the price of ten-year bonds will be *relatively* higher (and therefore the yield lower) than seven-year bonds. This preference for ten year bonds over seven year bonds is referred to as the “preferred habitat.”

Therefore the term structure reflects the expectation of future interest rates plus a premium or discount reflecting the demand and supply for bonds of a given maturity range (or habitat).

1. **Market Segmentation Theory**

The Market Segmentation Theory asserts that the prices of bonds (and therefore the yields) are affected by *only* by variations of supply and demand for specific maturities and are *not* affected by expectations of future rates.

In other words, market participants are unwilling (or unable) to shift from one maturity sector to another to take advantage of opportunities arising from differences in expected future rates and implied forward rates.

1. **Describe the empirical term structure work described in the on pages 117 through 119.**

The text book sites the research of [Antti Ilmanen](http://www.aqr.com/InsightAwardApp/bios.htm#AnttiIlmanen). He plots yields as a function of duration (not maturity – see Exhibit 5-11 on page 118) and finds yield increases dramatically in duration through about 2 years, less steeply though about 5 years and then flattens and eventually declines in longer durations. Ilmanen concludes yields are a function of:

1. Market’s expectations of future rate changes (as discussed above)
2. Liability matching or exogenous demand for specific maturities (Market Segmentation/Preferred Habitat)
3. Yield premiums that compensate market participants for interest rates risk (measured by duration)
4. Convexity Bias. “Convexity bias” means market participants prefer bonds with greater convexity. Recall that convexity measures the curvature or change in the slope of the price/yield function. Greater convexity means bonds experience a larger gain when rates fall relative to the loss when rates rise. Investors will pay a premium (and therefore accept a lower yield) for bonds with greater convexity.
5. **You have just lookup up the YTMs the 6 month, 1 year and 2 year on-the-run treasury securities. You have also looked up the coupons for the 1.5 year and 2 year bonds. The information is in the table below. All rates are in BEY terms.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Years** | **Periods** | **Coup %** | **YTM** |
| **0.5** | **1** |  | **2.00%** |
| **1** | **2** |  | **2.50%** |
| **1.5** | **3** | **3.00%** |  |
| **2** | **4** | **3.60%** | **3.40%** |

1. **Use linear interpolation to compute a YTM for the 1.5 year (3 period) bond.**

Use the value that is half way between the 2 period and 4 period YTMs:

2.50% + (3.40% – 2.50%)/(4 – 2) = 2.95%

|  |  |  |  |
| --- | --- | --- | --- |
| Years | Periods | Coup % | YTM |
| 0.5 | 1 |  | 2.00% |
| 1 | 2 |  | 2.50% |
| 1.5 | 3 | 3.00% | *2.95%* |
| 2 | 4 | 3.60% | 3.40% |

1. **Why do we use the linear interpolation method and not the market YTM for the 1.5 bond?**

Because since the 1.5 year bond is most likely a 6-month old two year bond, and therefore “off-the-run” it will be less liquid and market participants buying the bond will require a liquidity premium for holding the bond. Therefore the market YTM will likely be higher than the YTM computed as the midpoint between the two on-the-runs bonds.

1. **Compute the price of the 1.5 year bond**

N = 3, PMT = 3.00/2 = 1.50, I/Y = 2.95/2 = 1.475 FV = 100 PV = 100.07

1. **Compute the theoretical spot zero rate for a payment that occurs in exactly 1.5 years (3 periods). This rate is reported as 2 x z3. This method is called “boot strapping.”**

P3 = C/(1 + z1) + C/(1 + z2)2 + (C + M)/(1 + **z3**)3

z3 = (C + M)/[P3 – C/(1 + z1) – C/(1 + z2)2 ]1/3 – 1

z1 = YTM1/2 = 2.00%/2 = 0.01; z2 = YTM2/2 = 2.50%/2 = 0.0125; C = 1.50; M = 100

z3 = {101.5/[100.07 – 1.50/(1.01) – 1.50/(1.0125)2]}1/3 – 1

z3 = {101.5/[100.07 – 1.4851 – 1.4632]}1/3 – 1

z3 = {101.5/[97.1217]}1/3 – 1

z3 = {101.5/[97.1217]}1/3 – 1

z3 = {1.0451}1/3 – 1

z3 = 1.0148 – 1

z3 = 0.0148

 The 1.5 year (3 period) theoretical spot rate is 2 x 0.0148 = 2.96%

1. **The Table below shows tradable spot zero STRIPS rates. All rates are in BEY terms.**

|  |  |  |
| --- | --- | --- |
| **Years** | **Periods** | **STRIPS** |
| **0.5** | **1** | **1.00%** |
| **1** | **2** | **2.00%** |
| **1.5** | **3** | **3.00%** |
| **2** | **4** | **4.00%** |
| **2.5** | **5** | **5.00%** |
| **3** | **6** | **6.00%** |

1. **Compute the rate can you lock in today for a forward loan starting in one year for and lasting one year.**

Borrowing in one year for one year means borrowing starting at time 2 and ending at time 4.

A =2 and B = 4 so we need to compute *f*2,4.

*fA,B* = [(1 + zB)B/(1 + zA)A]1/(B – A) – 1

*f2,4* = [(1 + 0.04/2)4/(1 + 0.02/2)2]1/(4 – 2) – 1 = [1.024/1.012]1/2 – 1 = (1.0824/1.0201)1/2 – 1

= 1.06111/2 – 1 = 1.0301 – 1 = 0.0301

0.0301 × 2 = 6.02%

This is the implied forward rate “in 1 year for 1 year” or “starting in 1 year and ending in 2 years.”

Note that this satisfies the equation:

(1 + zA)A(1 + *fA,B*)(B – A) = (1 + zB)B  = (1 + **0.02**/2)2(1 + **0.0602**/2)2 = (1 + **0.04**/2)4

1. **Compare your answer in part (a) to the one-year spot zero rate. Is it higher or lower?**

Spot zero one-year rate is 2.00%.

One-year forward one-year rate is 6.02%

The one-year forward rate in one year is greater.

1. **An opinion in a financial blog post states that if the implied forward rate for a given maturity exceeds the spot rate for that maturity, then rates will be higher in the future. Conversely, if the implied forward rate is less than the spot rate, rates will be lower in the future. To which of the Term Structure Theories does this writer subscribe? *EXPLAIN*.**

Pure Expectations Hypothesis.

Current prices and yields (and therefore implied spot rates and implied forward rates) exclusively represent the expected future rates. There are no “biases” (other factors) in the yields of current bonds.

1. **In 2 years you wish to lend for 1 year. Compute the forward rate you can lock in today.**

Lending in 2 years for 1 year means starting at time 4 and ending at time 6.

A = 4 and B = 6 so we need to compute *f*4,6.

*fA,B* = [(1 + zB)B/(1 + zA)A]1/(B – A) – 1

*f4,6* = [(1 + 0.06/2)6/(1 + 0.04/2)4]1/(6 – 4) – 1 = [1.036/1.024]1/2 – 1 = (1.1941+/1.0824)1/2 – 1

= 1.10311/2 – 1 = 1.0503 – 1 = 0.0503

0.0503 × 2 = 10.06%

This is the implied forward rate “in 2 years for 1 year” or “starting in 2 years and ending in 3 years.”

1. **The Table below shows tradable spot zero STRIPS rates. All rates are in BEY terms.**

**Note the inverted Yield curve.**

|  |  |  |
| --- | --- | --- |
| **Years** | **Periods** | **STRIPS** |
| **0.5** | **1** | **4.50%** |
| **1** | **2** | **4.00%** |
| **1.5** | **3** | **3.50%** |
| **2** | **4** | **3.00%** |
| **2.5** | **5** | **2.50%** |
| **3** | **6** | **2.00%** |

1. **Compute the rate can you lock in today for a forward loan starting in one year for and lasting one year.**

Borrowing in one year for one year means borrowing starting at time 2 and ending at time 4.

A =2 and B = 4 so we need to compute *f*2,4.

*fA,B* = [(1 + zB)B/(1 + zA)A]1/(B – A) – 1

*f2,4* = [(1 + 0.03/2)4/(1 + 0.04/2)2]1/(4 – 2) – 1 = [1.0154/1.022]1/2 – 1 = (1.0614/1.0404)1/2 – 1

= 1.02011/2 – 1 = 1.0100 – 1 = 0.0100

0.0100 × 2 = 2.00%

This is the implied forward rate “in 1 year for 1 year” or “starting in 1 year and ending in 2 years.”

1. **Compare your answer in part (a) to the one-year spot zero rate. Is it higher or lower?**

Spot zero one-year rate is 4.00%.

One-year forward one-year rate is 2.00%

The one-year forward rate in one year is lower.

1. **An opinion in a financial blog post states the current inverted term structure (shown in the table for this question) is function of both expected future rates and liabilities associated with the managed bond portfolio. To which of the Term Structure Theories does this writer subscribe? *EXPLAIN*.**

Preferred Habitat Theory. Current prices and yields (and therefore implied spot rates and implied forward rates) are ***not an unbiased estimate of the market’s expectations*** of future interest rates. Prices of current bonds (and therefore the yields and implied forward rates) are affected by supply and demand for specific maturities.

The implication is the bond portfolio managers moved “out the curve” from short maturity to long maturity not just because of economic expectations, but because of specific liabilities.

1. **Describe the following rate curves:**

**A Yield Curve:**

A chart with maturity on the X-axis and yields to maturity on the Y-axis. All the bond yields depicted on the curve are similar. For example, all AAA corporate or all BBB munis. If the bond yields depicted on the curve are for the on-the-run treasuries, then it is The Yield Curve.

**The Yield Curve:**

A chart with maturity on the X-axis and yields to maturity for on-the-run treasuries on the Y-axis.

**Spot Zero Curve**

A chart with maturity on the X-axis and yields for any pure-discount zero-coupon instruments on the Y-axis. These rates are available today so they are called “spot” rates. For example, the curve might depict the market yields for Treasury STRIPS.

**Theoretical Spot Zero Curve**

A chart with maturity on the X-axis and yields for theoretical zero-coupon Treasury instruments on the Y-axis. These rates are theoretical because the y are calculated using the YTMs and prices of on-the-run Treasuries using the “bootstrap” method. We would expect the theoretical spot zero rates to be lower than the Treasury STRIPS zero curve because the YTMs for the on-the-run Treasuries do not contain any liquidity premium. Since Treasury STRIPS are not as liquid as on-the-run Treasuries, the STRIP yields are higher.

**Implied Forward Rate Curve**

A chart with maturity on the X-axis and yields for forward rates Y-axis. Usually all the forward rates on the chart start at the same point in time – for example the six-month rate starting in 1 year, the 1-year rate starting in 1 year, the 1.5-year rate starting in 1 year and so on.

These are the no-arbitrage “forward rates” implied by a set of spot zero rates. For example it might be the Treasury STRIP implied forward rate curve or the Theoretical Spot Zero implied forward curve.

**Swap Curve**

A chart with maturity on the X-axis and fixed coupon rates of market-quoted interest rate swaps on the Y-axis. A swap curve represents rates offered by banks to high-quality market participants.