

Hi and welcome,

This is a brief sample to provide you with an idea of what my CFA study notes look like.

The style is to provide key content coverage followed by working examples.

Mixed in you will see my “*Professor’s Comments*” and “*Exam Tips*”, I’ve included these to give you my thoughts on how I believe something will show up on the exam or how best to approach learning a concept....or even if I believe you should just skip something altogether.

If you have written the exam before, you can use my materials to get back up to speed very quickly.

If you are a first time writer, you can use my materials to help focus your study efforts and build your knowledge base.

If you have any questions, please do not hesitate to reach out to me by email.

All the best,



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Director of Learning
Exam Success

Level 3

Study Session 7 Fixed Income Portfolio Management (1)

READING 18:

Introduction to Fixed Income Portfolio Management

READING 19:

Liability Driven and Index Based Strategies

Introduction to Fixed Income Portfolio Management

Role of Fixed Income Securities in Portfolios

Ok you are going right back to your Level 1 knowledge, fixed income securities provide diversification benefits, income (regular cash flows) and inflation hedging potential.

Key Points to Know:

- Fixed income securities have low correlations with equity securities.(ie. less than +1)
- Fixed income securities have payment schedules of interest and principal. (link to dedicated portfolios, laddered portfolios and buy and hold strategies)
- Inflation linked bonds (ie. real return bonds or floating coupon bonds) provide inflation protection.
- Volatility of real interest rates is lower than the volatility of nominal interest rates, so inflation linked bonds have lower volatility than conventional bonds.

Exam Tip:

Key points to write in your answer include fixed income securities have low correlations, so your portfolio will have higher risk adjusted returns and inflation linked bonds protect your purchasing power.

Trivial Point to Know:

Fixed coupon bonds do not provide inflation protection.

Floating rate bonds have inflation protection for the coupons, but not for the principal.

Inflation linked bonds have inflation protection for both coupons and principal.

So if you are asked to select an appropriate security that offers inflation protection make sure you know if they want protection for the coupons or protection for the principal (or both).

Fixed Income Mandates

1) **Liability Mandates** - ensure that liabilities are covered and shortfall risk is minimized.

- Cash flow matching** - liability payouts are exactly matched by coupon and principal payments, in theory there is no reinvestment risk, minimal rebalancing required and no unrealistic assumptions...it is a very simple strategy.
- Duration matching** - insures that your assets and liabilities change by the same amount when a “parallel” change in interest rates occurs....rebalancing is a key consideration...it is a complex strategy.
- Contingent immunization** - combines immunization with active management of any excess funds...used by pensions that are overfunded and have a surplus.
- Horizon matching** - is a strategy that combines duration matching and cash flow matching, where short term liabilities (under 5 years) are cash flow matched, while long term liabilities are duration matched. This strategy provides the manager with flexibility.

2) Total Return Mandates - In contrast to liability mandates, focus on tracking or outperforming the benchmark. Here the portfolio manager is matching *risk factors* such as *duration, credit, call risk* and *sector risk*. Depending on which strategy you use, you set targets for **active return** and **active risk**.

Active return equals the difference between the return generated by your portfolio and the benchmark return.

Active risk equals the standard deviation of the active return (we also call this *tracking error*)

Total Return Approaches:

- a) **Pure indexing** - replicating the index, has target active return and active risk both equal to zero...characterized by portfolios that have low turnover.
- b) **Enhanced indexing** - allows some deviation from the benchmark risk factors in order to generate additional return to modestly outperform the benchmark, however duration is matched! The target active return and active risk are both (modestly) positive....the portfolio will experience a modest level of turnover.
- c) **Active management** - allows for larger deviations from the benchmark risk factors in order to outperform the benchmark, including deviations in duration....portfolio will have higher turnover and higher costs.

Quick Example:

Data below is given for three fixed income funds. All three funds use the same index as their benchmark.

	Index	Fund A	Fund B	Fund C
Average maturity	7.35	8.1	7.40	7.36
Modified duration	5.85	6.95	5.88	5.84
Average yield	2.05	2.10	2.08	2.06
Convexity	0.90	1.09	0.92	0.90
AAA holdings	60%	60%	58%	61%
AA holdings	30%	20%	27%	29%
BB holdings	10%	20%	15%	10%
U.S. holdings	75%	70%	65%	76%
International holdings	25%	30%	35%	24%

Identify the total return approach each fund is using based only on the data given.

Solution:

Fund B uses an enhanced indexing approach. Fund B's modified duration and convexity are very close to those of the benchmark but still differ slightly. Fund B also has deviations in quality, maturity exposure, and country exposures from the benchmark, providing further evidence of an enhanced indexing approach.

Fund C uses a pure indexing approach because it provides the closest match to the Index. The risk and return characteristics are almost identical between Fund C and the Index.

Fund A uses an active management approach because risk and return characteristics, quality, maturity exposure, and country exposure differ by a large amount from the index. The key difference to look for is the difference in modified duration 6.95 for Fund A versus 5.85 for the Index. Other differences exist between Fund A and the index, but a sizable duration mismatch provides the strongest evidence of an active management approach.

Bond Market Liquidity

The major take away here is to know that bonds trade over the counter, so search costs are high, discouraging liquidity, also bonds have many unique features that also affect liquidity. In contrast, equities trade on the exchange and are homogeneous and thus they do not have liquidity issues.

Be aware that we define liquidity by the size of the bid-ask spread.

Liquidity Among Bond Market Sub-Sectors

Sub-sectors are defined by issuer type (*government bonds* are more liquid than *corporate* and *securitized securities*), credit quality (*high quality bonds* are more liquid than *low quality bonds*), issue size (*smaller issues* are less liquid than *larger issues*) and maturity (*longer term bonds* tend to be less liquid than *shorter term bonds*).

Effects of Liquidity

1) Pricing - the text simply says that we use matrix pricing for illiquid bonds. It also states that bond transaction prices may be “stale”, so they may not be reliable.

2) Portfolio construction - a *buy and hold investor* will prefer less liquid bonds to get the higher yield, while an *active trader* will want liquid bonds and be willing to give up some return to get them.

Exam Tip:

There is a tradeoff between yield and liquidity (illiquid bonds have higher yields), so if the question says the manager is concerned about liquidity or incurring trading costs, etc...you should recommend using derivatives (such as futures) or using bond ETFs to get exposure to the asset class.

A Model for Fixed Income Returns

The text tells us that *yield* alone provides an incomplete measure of *expected return*...and portfolio management decisions are based on expected returns, so we need to examine the following components of expected return:

$$\text{Expected Return} = Y + \text{RD} + E(\Delta P) - E(\text{CR}) + E(\text{C})$$

Component		Calculation	Interpretation
Y	Yield Income	$= \frac{\text{Annual Coupon}}{\text{Bond's Market Price}}$	Includes coupon and reinvestment income
RD	Rolldown Return	$= \frac{\text{Bond Price}_{\text{End}} - \text{Bond Price}_{\text{BEG}}}{\text{Bond Price}_{\text{BEG}}}$	Change in the bond price as time passes, " <i>constant yield price trajectory</i> "
E(ΔP)	Expected change in price	$\% \Delta P = (-)(\text{MD})(\Delta Y) + (1/2)(\text{C})(\Delta Y)^2$	Based on investors views of yields and yield spreads
E(CR)	Expected credit losses	No calculation, will be given	Measured as (probability of default) x (expected loss severity)
E(C)	Expected currency gains or losses	No calculation, will be given	

Note: the text tells us that the yield income plus the rolldown yield equals the "*Bond's rolling yield*".

Be aware:

- Assumptions of yield to maturity are unrealistic, which compromises this model.
- Duration and Convexity are only approximations, which compromises this model.
- This model ignores financing costs, which limits its real world use.

Quick Example:

Zip Kellman manages the \$250 million Global Bond Fund for U.S. Steel's Pension Plan. The current average bond price is 96.7, with an average annual coupon payment per \$100 of par of \$4.25. Overall duration and convexity for the portfolio are estimated to be 8.5 and 2.9 respectively. Over the next one year period, Kellman has the following expectations:

- 1) the average bond price will increase to 97.5
- 2) yields will decrease by 50 basis points
- 3) credit losses in the portfolio will be nil
- 4) on average foreign currencies will depreciate relative to the USD by 1%

Calculate the total expected return for the portfolio (assume no reinvestment of coupon income).

Solution:

$$E(r) = Y + RD + E(\Delta P) + E(CR) + E(C)$$

$$E(r) = 4.395\% + 0.827\% + 4.25\% - 0\% - 1\%$$

$$E(r) = 8.472\%$$

The components are calculated as:

$$Y = 4.25 / 96.7 = 0.04395 \text{ or } 4.395\%$$

$$RD = \frac{97.5 - 96.7}{96.7} \times 100 = 0.827\%$$

$$E(\Delta P) = -(8.5)(-0.005) + (1/2)(2.9)(-0.005)^2 = 0.0425 \text{ or } 4.25\%$$

$$E(CR) = 0$$

$$E(C) = -1\%$$

Leveraged Portfolio Return

Professor's Comment:

I think the question will be in the context of an investor that must earn a certain minimum return (to fund a liability), but they are in a "low interest rate environment" and cannot generate the required return, so you suggest that they use leverage to enhance the return!

$$R_p = \frac{\text{Portfolio Return}}{\text{Portfolio Equity}} = \frac{R_I \times (V_E + V_B) - (V_B \times R_B)}{V_E} = R_I + \frac{V_B}{V_E} (R_I - R_B)$$

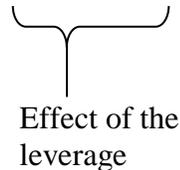
Where:

R_I = return on invested funds

V_E = value of "equity" invested

V_B = value of borrowed funds

R_B = cost of borrowing


Effect of the leverage

Note:

If $R_I > R_B$, then leverage increases the portfolio's return

IF $R_I < R_B$, then leverage decreases the portfolio's return

Quick Example:

Currently the Stoker Bond Fund has \$75 million invested in AA or higher Corporate Bonds, with an average return of 5.5%. The manager of the fund is looking to use leverage in an attempt to augment the fund's overall return.

Calculate the leveraged portfolio return assuming the manager borrows \$25 million at a cost of 3%.

Solution:

You can use any form of the equation given above to solve this question.

$$R_p = R_I + \frac{V_B}{V_E} (R_I - R_B)$$

$$R_p = 5.5\% + \frac{25}{75} (5.5\% - 3\%)$$

$$R_p = 6.33\%$$