Reading 23
Fixed-Income Portfolio Management-Part II

A、Evaluate the effect of leverage on portfolio duration and investment returns.

Leverage

- Leverage means that funds are borrowed to purchase some of the securities involved in the strategy with the expectation of earning a return in excess of the cost of funds.
- When return earned on the investment of the borrowed funds > (<) interest cost, leveraging magnifies the return (losses).
- Leveraging increases the interest rate sensitivity of the equity in the portfolio.
- Formula of calculating duration of equity

$$D_E = \frac{D_A A - D_L L}{E}$$

Where,

A=amount of invested fund; D_A *= duration of assets*

L= amount of borrowed fund; D_L *= duration of liability*

E= amount of equity invested=A-L; D_L *= duration of equity*

- The greater the leverage, the wider the range of potential outcomes.
- The higher the leverage, the higher the risk.
- The greater the variability in the annual return on the invested funds, the wider the range of potential outcomes i.e. the higher the risk.
- Formula of calculating portfolio rate of return

$$R_p = r_F + (B/E) \times (r_F - k)$$

Where,

r_F *= Return on funds invested*

k *= cost of borrowing*

Example 1

（1）Assume that a manager has $40 million of funds to invest. The manager then borrows an additional $100 million at 4 percent interest in the hopes of magnifying the rate of return on the portfolio.

Further assume that the manager can invest all of the funds at a 4.5 percent rate of return. Calculate portfolio rate of return.

（2）Suppose the $140 million bond portfolio (A = $140 million) has a duration of 4.00 (DA = 4.00). However, $100 million of the value of the portfolio is borrowed (L = $100 million; E = A –L = $40 million). Let us assume that the duration of the liabilities is 1.00 (DL = 1.00). Calculate duration of equity.

Answer

（1） $R_p = 0.045 + (100/40) \times (0.045 - 0.04) = 0.0575 = 5.75\%$

(2) $D_E = \dfrac{4 \times 140 - 1 \times 100}{40} = 11.5$

B、Discuss the use of repurchase agreements (repos) to finance bond purchases and the factors that affect the repo rate.

Repurchase Agreements

A repurchase agreement is the sale of a security with a commitment by the seller to buy back the same security from the purchaser at a specified price on a designated future date.

- Basically, a repurchase agreement is a collateralized loan, where the collateral is the security that is sold and subsequently repurchased.
- The difference between the purchase (repurchase) price and the sale price is the dollar interest cost of the loan. The interest rate is called the repo rate.
- Provide dealers (borrowers) a low cost way to borrow funds. The repo rate is lower than the cost of bank financing.
- Provide investors (lenders) an attractive yield on a short-term secured transaction that is highly liquid.
- Forms of Transfer of Securities
  - ✓ Physical delivery: It is the most costly method of transferring securities particularly for short-term transactions because of the costs associated with delivering the collateral.
  - ✓ Deliver the securities to a custodial account at the **seller's bank** (acting as a trustee): This is a cost-effective way to reduce the fees

associated with delivery.

- ✓ Wire-transfer or by means of credit & debits to the accounts of banks acting as clearing agents for their customers: This method is cheaper than physical delivery but involves high fees and transfer charges.
- ✓ Delivery is sometimes not required if the borrower's credit risk is low, if the parties are familiar with one another, or if the transaction is short-term.

Determinants of the Repo Rate

- Quality of collateral
  - ✓ Higher the quality of the collateral, the lower the repo rate will be.
- Term of the repo
  - ✓ Longer the maturity of the repo, the higher the rate will be.
- Delivery requirement
  - ✓ Physical delivery ⟶ repo rate ↓
  - ✓ Collateral deposited with borrower bank ⟶ repo rate ↑
  - ✓ No delivery ⟶ repo rate ↑
- Availability of collateral
  - ✓ When it is difficult to obtain the securities or when the collateral is highly demanded, the repo rate will be lower.
- Prevailing federal funds rate
  - ✓ As Fed fund rate ↑ ⟶ repo rate ↑
- Borrowers credit rating
  - ✓ As borrower's credit rating ↑ ⟶ repo rate ↓
- Seasonal factors
  - ✓ Repo rate changes as the demand for (and supply of) funds at financial institutions changes due to seasonal factors.

C、Critique the use of standard deviation, target semivariance, shortfall risk, and value at risk as measures of fixed-income portfolio risk.

Standard Deviation

- Standard deviation assumes normal (symmetric) distribution which is

not always the case i.e. portfolios consist of securities with embedded options.

- Large number of inputs is required to be estimated as the number of bonds in the portfolio increases.
- It is based on historical data and does not provide accurate estimates because characteristics of a bond change over time.

Semivariance

- It is a type of downside risk measure that measures the dispersion of returns below the target return.
- Unlike standard deviation or variance, its definition is ambiguous and its statistical properties are not well understood.
- It is difficult to compute particularly for large portfolio.
- In case of symmetric investment returns, it does not provide any additional information relative to variance or standard deviation; while in case of asymmetric investment returns, semi-variance does not provide a good forecast of future downside risk.
- It is statistically less accurate as it is based on only half of the distribution.

Shortfall Risk (or risk of loss)

- It refers to the probability of actual return being less than the target return.
- The magnitude of the losses below the target return and impact of outliers is ignored.
- It is ambiguity, poor statistical understanding, and difficulty of forecasting.

Value at Risk (VAR)

- It provides an estimate of loss (in money terms) that is expected to be exceeded with a given level of probability over a specified time period.
- VAR ignores the magnitude of the losses that exceed the losses specified by VAR.