RET RPIRM Model Solutions
Fall 2024

1. Learning Objectives:

2. The candidate will recognize and appropriately reflect the role of plan investments in managing plan sponsor risk and make recommendations.

3. The candidate will understand how to evaluate the stakeholders' financial goals and risk management with respect to their plan.

Learning Outcomes:

(2a) Evaluate the interaction of plan investments with plan design, valuation, accounting and funding.

(2d) Apply and evaluate strategies and techniques for asset/liability management.

(2e) Provide advice and analysis to plan sponsors regarding the mitigation of investment risks.

(3a) Compare the interests of plan sponsors, employees, shareholders, taxpayers and other stakeholders related to the financial management of a retirement plan.

(3f) Provide advice and analysis to plan sponsors and other stakeholders regarding the mitigation of pension plan risks.

Sources:

RPIRM 148-17, RPRIM 147-17, Pension Risk Transfer: Evaluating Impact and Barriers for Derisking Strategies

Commentary on Question:

Candidates generally did well on this question , which was aiming to test their understanding of risk transfer strategies (buy-ins and buy-outs). In part a), many candidates failed to compare (show similarities) and contrast (show differences) the two strategies, but rather described them. In part b), we accepted effective duration calculations with different differential ranges (i.e. 1bp, 50bps, 100bps, etc.) as long as the proper formula was used (Effective duration = (P(1) - P(2)) / (2 x P(0) x Y)).

Solution:

See excel spreadsheet.

2. Learning Objectives:

1. The candidate will understand the issues facing retirement plan sponsors regarding investment of fund assets.

Learning Outcomes:

(1a) Assess the different types and combinations of investment vehicles for providing retirement benefits given the particulars of the stakeholders' financial circumstances, philosophy, industry, work force and benefit package.

(1d) Assess the potential effects of various investments and investment policies on all of the stakeholders, including tax implications.

Sources:

RPIRM-108-13: Introduction and Overview of Retirement Plan Investments
Modern Investment Management, Litterman, Robert, 2003, Ch. 24

Commentary on Question:

Candidates performed significantly better on the "Contrast" portion of the question than on the "Compare" portion of the question. Many candidates organized their response by focusing on the three portfolios A, B and C. To better maximize their score, it would be advisable to organize responses to a "Compare/Contrast" question by clearly including both "Compare" responses and "Contrast" responses. The model solution is organized by "Compare/Contrast" and also by ABC's three issues (investment objective, interest rate risk and credit risk).

Additionally, some candidates did not compute the hedge ratio (or similar) to enable a comparison of interest rate risk for the three portfolios.

2. Continued

Solution:
Company ABC sponsors a defined benefit pension plan. The company is considering the following three investment portfolios:

	Portfolio A	Portfolio B	Portfolio C
Target Fixed Income Allocation	70%	55%	40%
Target Public Equity Allocation	30%	45%	60%
Target Duration of Fixed Income Allocation	15	11	15
Minimum Credit Quality	BBB-	AA	No minimum

You are given:

- The liabilities have a duration of 12.0
- The liabilities are measured using a yield curve constructed with AA-rated bonds

Company ABC's investment objective is to maximize the overall asset return. However, they have interest rate risk and credit risk concerns.

Compare and contrast the three portfolios taking into consideration Company ABC's investment objective and concerns.

2. Continued

Compare

Goal of achieving a high return:

None of the three portfolios are fully invested in fixed income. This allows an opportunity to invest in return seeking assets (i.e., equities, alternatives) which would presumably have a higher expected return than fixed income securities.

Concern of interest rate risk:

Calculate hedge ratios of 3 portfolios: Target Fixed Income % * Duration of Target Fixed Income / Duration of Liabilities

70% * 15.0 / 12.0 = 87.5% ~ 88%
55% * 11.0 / 12.0 = 50.4% ~ 50%
40% * 15.0 / 12.0 = 50.0%

Portfolios B and C have roughly the same interest rate hedge ratio. Overall, all three portfolios have at least a 50% interest rate hedge ratio so at least half the interest rate risk is expected to be hedged under all three portfolios.

Concern of credit risk:

Portfolio B is a portfolio with a minimum credit quality of AA, which is the same as the liability, therefore reducing credit risk. Portfolios A and C are invested in credit quality lower than the liability, increasing credit risk.

Contrast

Goal of achieving a high return:

As the target allocation to fixed income decreases across the portfolio, the potential for higher returns increases. This presumes that return seeking assets (i.e., equities, alternatives) would have a higher expected return than fixed income.

Portfolio B has higher return potential than Portfolio A and Portfolio C has the higher return potential of all three.

Furthermore, the allowance of lower credit quality bonds in Portfolio C could introduce higher yielding bonds which could further enhance returns.

2. Continued

Concern of interest rate risk:

Portfolio A has a substantial amount of interest rate risk hedged with an interest rate hedge ratio of 88%. This is considerably higher than Portfolios B and C which have only approximately 50% interest rate risk hedged.

Concern of credit risk:

Portfolio C has the potential for higher credit risk when compared to Portfolios A and B, since it does not specify a minimum credit quality for bonds.

3. Learning Objectives:

3. The candidate will understand how to evaluate the stakeholders' financial goals and risk management with respect to their plan.

Learning Outcomes:

(3c) Analyze how the retirement plan integrates with the sponsor's overall financial position.

(3d) Understand and apply the principles of financial economics with respect to pension plan investing.

Sources:

Corporate Pension Risk Management and Corporate Finance: (soa.org)

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Describe four adjustments that can be made to the PBO to account for the pension liability under a holistic balance sheet approach.

Commentary on Question:

Many candidates did not respond with enough information to earn full points. The solution below is not exhaustive, points were given for any acceptable answer.

- PBO can be adjusted to represent an economic liability and reflect the real cost of the plan
- If the accounting mortality assumption is inadequate, the mortality and the mortality improvement assumptions should be adjusted
- Reflect the value of embedded options—specifically, options available to participants when interest rates change, such as adjustable cash balance crediting rate for a plan with a hybrid design formula, or interest rate used for lump-sum form of payment options
- Reflect the value of contingent liabilities based on the funded status of the pension plan—for example, additional insurance PBGC premiums or taxes on pension surpluses

(b) Describe the shortcomings of including the Net Pension Obligation instead of separating the pension asset and pension liability in the corporate balance sheet.

Commentary on Question:

Candidates generally performed relatively well on this question.

3. Continued

- The risk of pension plan investments is not reflected. The net pension obligation can be the same even if the portfolios of the pension plans are completely different (more risky or less risky)
- It does not adequately account for the size of the pension plan relative to the operating part of the business. The larger the size of the pension plan relative to the operating part of the business, the more leveraged the corporation is, and the larger the impact of pension plans on the corporation.
- There would be an impact to ratios such as Debt-to-equity, Long-term debt to equity, Asset-to-equity and WACC if using the holistic approach.

(c) Calculate the Weight Adjusted Cost of Capital (WACC) using:

(i) the accounting balance sheet; and

(ii) the holistic balance sheet

Commentary on Question:
In general, candidates did not perform well on this question. Several candidates knew how to calculate the WACC, but not the asset beta under the accounting and holistic balance sheets. The most common mistake for part i) was to use the equity beta given in the question instead of calculating an asset beta.

The response for this part is to be provided in the Excel spreadsheet.

(d) Explain how the long-term debt-to-equity ratio would be impacted if the pension liability were perfectly hedged, using the holistic balance sheet.

Commentary on Question:
Partial points were given when candidates defined the ratio or mentioned that the pension liability is included in the long-term debt numerator under the holistic balance sheet.

Using the holistic balance sheet, the long-term debt-to-equity ratio is defined as (long-term debt + pension liability) / equity. If the hedging is 100% effective, the pension liabilities can be removed from the formula and therefore, the long-term debt to equity ratio would decrease if perfectly hedged.

(e) Calculate how much equity capital is needed by XYZ Company to maintain the same equity beta if the plan no longer invests in equities.

Commentary on Question:
This question was poorly answered.

The response for this part is to be provided in the Excel spreadsheet.

4. Learning Objectives:

2. The candidate will recognize and appropriately reflect the role of plan investments in managing plan sponsor risk and make recommendations.

Learning Outcomes:

(2a) Evaluate the interaction of plan investments with plan design, valuation, accounting and funding.

(2b) Evaluate the interaction and relationship between plan investments and valuation assumptions/methods.

(2c) Evaluate how factors including cash flow requirements, various plan designs and various economic environments affect setting investment strategy.

(2d) Apply and evaluate strategies and techniques for asset/liability management.

Sources:

RPIRM-147-17, RPIRM-149-17, RPIRM-163-21, RPIRM-164-21, Pension risk transfer: evaluating impact and barriers for de-risking strategies

Commentary on Question:

Most candidates performed well on this question. Candidates generally scored higher on part a) than on part b). For both parts, candidates were expected to provide enough items to receive full marks.

Solution:

(a) Describe the risks associated with investing in fixed income securities.

Commentary on Question:

Some candidates listed risks but did not describe the risks as requested in the question.

Interest rate risk: Risk that the yield of a bond will change (and its value) due to changes in risk-free bond with the same cashflows.

Yield curve risk: Risk that the bond value will change due to a change in the shape of the yield curve (e.g. non-parallel curve movements)

Sector risk: Volatility of returns due to yield changes derived from changes in spread between the sector in question and the baseline yield curve (government). Changes in sector returns.

Credit risk: Changes in credit rating of the instrument will affect bond price.

4. Continued

Default (counterparty) risk : Risk that cash flows not paid due to the inability of the issuer to do so. Possibility that the issuer will go bankrupt and might not repay the loan.

Volatility (duration) risk: Bond value is impacted by how much interest rates move in either direction. Can be broken down into 1) Gamma exposure 2) Vega risk

Inflation risk: Some fixed income pays fixed payments and it does not take inflation into consideration. Fixed income securities are vulnerable to the erosion of purchasing power caused by inflation, which can reduce the real return on investment.

Currency risk: When investing in an investment denominated in a different currency. Changes in value of fixed income as currency changes. Can mitigate/eliminate risk using currency hedging techniques such as currency forward contracts.

Reinvestment risk: If interest risk fall, the coupon and principal may be reinvested at a lower rate

Liquidity risk: This refers to the risk of not being able to sell the bond quickly or at a fair price due to a lack of market demand or limited trading activity.

Prepayment risk: Return volatility arising from the over/under estimation of actual prepayment rates (Mortgage backed securities)

Security-specific risk: Risk that can not be explained by the other risk factors. Risk generally arises due to changes in the supply and demand of that security.

(b) The CFO of Company XYZ anticipates a fall in interest rates and proposes an asset mix of 100% in fixed income securities. The CFO asserts that the proposed asset mix would guarantee a lower and more stable level of employer contributions compared to the current asset mix.

Critique the CFO's assertion.

Commentary on Question:
A critique is analysis that covers both strengths and weaknesses. It may also include listing alternatives. Candidates were expected to base their critique on the information given in the question (funded status, open plan, salary average formula, etc.).

4. Continued

- If the CFO's prediction of future interest rate movements is inaccurate and interest rates actually rise, there is potential for an increase in the plan shortfall (if the decrease in assets is greater than the decrease in liabilities) and this could lead to higher contributions.
- The proposed 100% fixed income asset mix lacks diversification, potentially resulting in missed opportunities for returns attributable to diversification effects.
- As final salary pensions are linked to employees' earnings, any increase in wages due to inflation or promotions will lead to higher pension payments. Therefore, final salary plans are linked to inflation, and rising inflation rates would increase the plan's liabilities. Bonds providing only fixed income would not align well with the increasing liability cashflows.
  - Company XYZ could consider investing in inflation-linked bonds.
  - Historically, equities have been viewed as an effective hedge against inflation.
- The plan is not frozen/closed, meaning that the plan is probably not mature and that the duration of the plan is high.
  - There may be a scarcity of suitable long-dated bond assets available
  - A long investment horizon makes equities more attractive (current asset mix more attractive)
- The asset mix often determines the expected return used to discount the liabilities.
  100% fixed-income securities, having lower long-term expected returns, would decrease the discount rate, consequently decreasing the funded status and increasing the plan's cost.
- Growth assets such as equities are expected to yield higher long-term returns. By moving to 100% fixed income, the plan sacrifices potential performance, especially considering the current plan deficit. This sacrifice may result in the shortfall needing to be met by increasing the employer's contributions.
- An asset mix of 100% in fixed income would reduce the overall interest rate risk of the plan. May include a certain level of diversification among the fixed-income portfolio, such as a mix of corporate bonds, government bonds, real return bonds, fixed income derivative, etc.
- Replacing equities with fixed-income effectively reduces overall plan risk, and therefore contribution volatility, but need to keep in mind that bonds also carry risks (see part a)). Those risks mean that plan's liabilities won't necessarily move in the same magnitude as the plan's assets.

5. Learning Objectives:

3. The candidate will understand how to evaluate the stakeholders' financial goals and risk management with respect to their plan.

Learning Outcomes:

(3f) Provide advice and analysis to plan sponsors and other stakeholders regarding the mitigation of pension plan risks.

Sources:

RPIRM-128-13: The Impact of the Financial Crisis on Defined Benefit Plans and the Need for Counter Cyclical Funding Regulations, excluding appendices

Commentary on Question:

This question tested candidate's understanding of counter-cyclical funding rules. Many candidates identified some of the policy measures which would make funding regulations more counter-cyclical in nature as suggested in the paper, however fewer candidates properly described the benefits and challenges of such counter-cyclical funding rules. Points were also given for other benefits and challenges appropriately described in addition to those described below. In general, candidates answered Part A and Part C better than Part B.

Solution:

(a) Describe four potential benefits of implementing counter-cyclical funding rules in pension plan regulations.

1. **Long-Term financial sustainability:** Counter-cyclical funding regulations foster prudent funding practices to enhance the long-term financial viability of pension plans. For instance, accumulating reserves during economic expansions fortifies plans against market downturns, promoting long term financial sustainability.

2. **Risk mitigation:** Counter-cyclical funding regulations diminish the likelihood of benefit cuts or plan insolvency during economic downturns. By building up reserves when the plan sponsor is in good financial health, this creates a buffer against market volatility and allows for better risk management.

3. **Reduced financial pressure during market downturn:** By incorporating flexibility into funding rules based on prevailing market conditions, this can avoid undue pressure on plan sponsors at times when their own profitability or even continuity is under pressure.

4. **Better control of risks and costs:** With the improved stability in contributions and funded status, this ensures that plan sponsors can plan their funding obligations more effectively, giving them more control to manage risk and costs.

5. Continued

(b) Describe four potential challenges of implementing counter-cyclical funding rules in pension plan regulations.

1. **Complexity:** Implementing counter-cyclical funding rules adds layers of complexity to pension plan regulations. The process of determining appropriate mechanisms for adjusting funding requirements based on economic indicators demands careful consideration.

2. **Risk of Unintended Consequences:** There is a potential for unintended consequences, particularly if counter-cyclical funding rules are not implemented with precision. For example, over-smoothing of assets and contribution requirements could lead to underfunding during economic expansions or incentivize moral hazard behavior among plan sponsors.

3. **Increased Compliance Costs:** Compliance with counter-cyclical funding rules may impose additional financial burdens on plan sponsors. Meeting reporting requirements, conducting actuarial analyses, and adjusting funding strategies in response to changing economic conditions can all contribute to higher administrative expenses.

4. **Reduced access to funding surplus:** As counter-cyclical funding rules limits contribution holidays even during strong economic conditions, this increases pension funding costs for employers and reduces access to funding surplus.

(c) Explain how the use of asset smoothing and actuarial assumption smoothing can benefit defined benefit pension plans in the context of counter-cyclical funding rules.

Actuarial assumption smoothing gradually adjusts key assumptions (i.e. discount rates), which prevents large short-term changes in pension liabilities.

Asset smoothing can spread investment gains and losses over time, which in turn stabilize funded status despite short-term market fluctuations.

Smoothing mechanisms enable sponsors to adopt strategic, long-term funding strategies rather than reacting to short-term market shifts. This in turns promote long term planning and sustainability of pension plans.

6. Learning Objectives:

1. The candidate will understand the issues facing retirement plan sponsors regarding investment of fund assets.

Learning Outcomes:

(1c) Given a context, analyze a Statement of Investment Policy.

(1d) Assess the potential effects of various investments and investment policies on all of the stakeholders, including tax implications.

Sources:

RPIRM-132-14: CAPSA, Guideline No. 6, Pension Plan Prudent Investment Practices Guideline

RPIRM-103-15: Fiduciary Liability Issues for Selection of Investments

Solution:

(a) Critique XYZ's current investment practices.

Commentary on Question:

Some candidates proposed changes to the investment practices, whereas the question specifically asked to critique XYZ's investment practices. No credit was awarded unless the candidate critiqued the investment practices in addition to proposing changes.

- XYZ has not investment policy that sets out investment principles, strategic asset allocation, performance objectives and risk tolerances. It is a statutory requirement in some jurisdictions.
- It is likely that the internal committee does not have the skills to manage the investment and therefore is not following the Prudent Person Rule (the investments are not diversified, the investment is concentrated in just a few stocks).
- XYZ is not following the Duty to Diversify by having investment in only 3 individual stocks.
- XYZ is not following the Duty of Care rule by having 57% of the assets in one stock.
- XYZ may have issues fulfilling the Duty to Follow Statutory Constraints. Many jurisdictions have statutory constraints on investments and transactions. For example, it may not be possible to sell more than 10% of any of the stocks.
- XYZ is fulfilling its Duty to Make the Property Productive by investing the assets of the plan in equities, with an expected return over a risk free rate of return.

6. Continued

(b) Critique the above excerpt from the proposed investment policy statement considering CAPSA Guideline No. 6 and XYZ Company's fiduciary duties.

Commentary on Question:
The candidates who did not perform well failed to critique the elements of the excerpt or failed to critique the elements in the context of XYZ's fiduciary duties. Credit was awarded for valid critiques, whether or not the candidate specified the associated fiduciary duty.

- Regarding the Duty of Loyalty, the new investment policy will benefit the participants by being less risky and the retiree liabilities benefiting by a higher % in bonds. However, since the plan is overfunded perhaps it would be better for the participants to have less in equity to reduce risk even more.
- XYZ following the Prudent Delegation rule, by hiring ABC Investing to draft an investment policy and help set the investment strategy
- The investment objectives takes into consideration the demographics of the plan. For example, the retiree liability is 50% of the liability, and roughly 45% of the target mix is in cash and fixed income, with the duration of the fixed income fund approximately matching the duration of the liabilities
- It's good XYZ is monitoring the assets by meeting with ABC, but there should be more frequent monitoring (at least once a quarter) since market conditions can change quickly.
- Following Duty to Make the Property Productive – still holds true since 8% is higher than a risk-free return.

(c) Recommend changes to the proposed strategy. Justify your recommendations.

Commentary on Question:
Candidates who provided suggestions or considerations were not given any credit. Credit was awarded for recommendations supported by a justification.

- Since the plan is 110% funded and closed, the investments should be mostly bonds to protect the funded status. Recommend 90% bonds and 10% equity.
- Would not allow high yield bonds as part of the portfolio in order to protect the funded status.
- Lower the expected return to 6%/year since 8% is unreasonable if there are at least 45% bonds.
- Meet on a quarterly basis to monitor results.