

Corporate Defined Benefit Pension Plans

A Primer on Pension Accounting



The pension funding status is the key driver of the pension expense.

- Material changes in funding status significantly impact accounting costs.
- Higher interest rates are generally favorable for the pension plan as the service cost falls at a level more than the increase of the interest expense.
- The liability grows every year at an amount equal to the benefits accrued during the year and is reflected in the normal or service cost.
- The most significant demographic factor for the pension liability is changes to the labor force (e.g., terminations and new hires).
- Economic assumptions materially impact both the liability and assets.

There are two primary accounting methods for a pension plan sponsor:

Pension Funding – This is a measure of the status of the pension plan by the Internal Revenue Code (IRC) and measures the position of the pension's invested assets relative to the actuarial pension liability. The result of this measurement determines the extent to which a plan sponsor may have to contribute to the pension plan, and the tax deduction for this expense.

Two related methods exist for measuring the pension funding status: tax and accounting.

Pension Accounting – This reflects the impact of the pension plan in the financial statements. Disclosed in the notes are the status of the pension assets and liabilities. The accounting calculations and notes follow the mandate from the Financial Accounting Board (FASB), which reflect generally accepted accounting principles (GAAP).

The above two points highlight a critical distinction: there are separate rules for the funding status as defined by the IRS, and the accounting implications as set by FASB. The crucial difference between the two is that the IRC may require an actual cash contribution, while the other will reflect a change (a reduction in the case of a contribution) in the plan sponsor's reported earnings. While the two issues are related, they do not necessarily lead to the same requirements for the plan sponsor.

Defining the Liability

The principal driver of the liability for the pension plan is the promised benefits at retirement for the plan participants. This revolves around a combination of the final compensation at retirement and the amount of accrued service with the employer. Increases in either the salary or the accrued service will increase the amount of the liability, while an increase in the interest rate will lower the present value of these future liabilities.

Pensions are a form of deferred compensation.

From the perspective of the business, the key attribute of a pension plan is that it is a form of *deferred compensation*. This employee benefit provides the company one principal advantage: to the extent that it can earn more on the invested assets of the pension than the discount rate used to calculate their present value, it is advantageous for the company to provide the benefit to the employee.¹

The accounting liability of the pension plan liability can use different calculations. The three principal measures are the following:

Varying definitions of the liability differ by what is accrued and what is expected.

Accumulated Benefit Obligation (ABO) – This is the least inclusive measure and includes only the benefits of the current employees earned to date at the current salary level.

Projected Benefit Obligation (PBO) – This is a more inclusive measure and includes the benefits of the current employees earned to date with their expected ending salary included.

Expected Benefit Obligation (EBO) – This is the most comprehensive measure and includes all the current employees with both expected benefits earned until retirement and their projected final salary.

Each of these projected cash outflows is valued using the corporate bond rates applicable at the valuation period and discounted back to present to derive the present value of the expected cash outlays.

Tax reporting is not equal to accounting reporting.

In using these measures for accounting purposes, the PBO is the primary liability target used for FASB reporting purposes. While not the actual liability, it is a parsimonious trade-off between the stricter EBO, which includes all

¹ The key measure here is the return on capital (RoC) deployed in the business. If the RoC of the business is higher than the discount rate used to value the pension liabilities, the business has improved its RoC by the marginal between the two.

expected (but unearned) liabilities, and the ABO that reflects no future service liabilities.

There is one fundamental distinction between the IRS liability and the FSB liability: the IRS liability uses the Pension Protection Act (PPA) discount curve, while the FASB employs market -based yields.² The result is that a liability with identical cash flows will vary in value depending upon the accounting standard.³

Exhibit I. Constructing the Liability

The three major definitions of the liability are progressively more inclusive.



Liability Valuation Principles

The liability is a measure of the present value of future benefits.

While the specific calculation of the pension liability can take different forms, there are core principles that always apply to the valuation. An individual has a unique benefit stream that is calculated using the specific plan provisions, including assumptions on mortality, morbidity, retirement, and employment changes. The aggregate of all the plan participants yields the future benefits of all beneficiaries, and the discounted value of this plan is the *present value of the future benefits (PVFB)*.

There are several accounting dimensions for unearned future liabilities. To ensure that costs are not recognized before they occur, the cost components are broken down into three segments:

The least inclusive measure is the Actuarial Liability.

Actuarial Liability (AL) – This portion of the liability that is the result of past service and is already earned by the beneficiaries. When the plan liability includes a final average salary (FS) as a determinant, then the Actuarial

² See ASC 715 for further details on financial statement disclosure of defined benefit pensions: <https://asc.fasb.org/imageRoot/03/64938803.pdf>

³ See CRM's *Primer on the Pension Yield Curve* for further insight.

Liability is equivalent to the PBO liability; when it does not, the Actuarial Liability is equivalent to the ABO and is called the present value of accumulated benefits (PVAB). For pension funding, this is called the current liability and is calculated using the Internal Revenue Service (IRS) mandated interest rates and mortality assumptions.

Exhibit 2. Relationship to the Current Liability

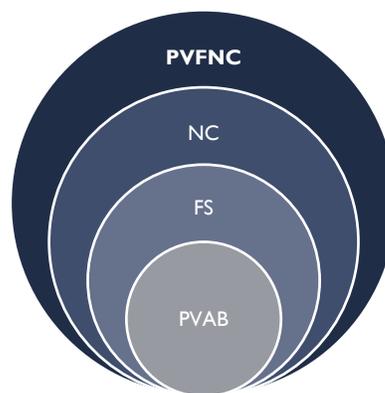


Normal Cost (NC) –This cost item reflects the current year of service and is indicative of the deferred compensation for the year. In pension accounting, this is parallel to the service cost (SC).

Present Value of Future Normal Costs (PVFNC) –This is the portion of the PVFB that is attributable to the future years of service and can reflect the projects salary increases (if not already done so in the AL), and the future NC for each year.

Exhibit 3. The Composition of the Actuarial Liability

The total liability includes accrued benefits, future salary increase, current benefits, and the future expected benefits.



These components are the principal cost drivers when accounting for a defined benefit pension liability. The exact method for calculation of the cost is determined by the actuary, with the primary requirement that the approach is consistent across the plan (e.g., all cost calculations use the same method).

Table I. Funding and Accounting Measures⁴

There are different names given to the pension measure that depend on whether funding or accounting is the goal.

	Funding Name	Accounting Name	Salary Basis	Service Basis
Present Value of Future Benefits	Not Defined	Expected Benefit Obligation	Projected	Projected
Actuarial Liability	Actuarial Liability	Projected Benefit Obligation	Projected	Current
Present Value of Accumulated Benefits	Current Liability	Accumulated Benefit Obligation	Current	Current
Normal Cost	Normal Cost	Service Cost	Projected	One Year

Pension Funding Principles

The principal concern of pension funding is to ensure sufficient assets to meet the liability.

The funding status of the pension plan is the critical determinant for meeting the requirements of both the IRS and FASB. The funding status will determine the degree to which a plan sponsor will have to make (or not) contributions to a plan, and the resultant cash flow and expense charges. There are various reasons for pre-funding a pension plan, and these include the following:

- All US tax-qualified pension plans must meet the Employment Retirement Income Security Act (ERISA) funding requirements
- Allocation of costs to the year of realization
- Additional security for beneficiaries with increased funding
- Tax-free growth of pension plan assets
- Tax deduction of contributions up to the maximum amount
- Deferral of tax on the compensation until benefits are received

⁴ Extracted from the Fundamentals of Current Pension Funding and Accounting for Private Sector Pension Plans, American Academy of Actuaries (2004). http://www.actuary.org/pdf/pension/fundamentals_0704.pdf

Tax Deduction of Contributions

Contributions are required, but excess amounts have limited tax advantages.

Under the IRC, the tax deduction for the contribution has both a minimum requirement and a maximum limit per tax year. The minimum contribution per year is composed of the following:

Normal Cost – The additional year of benefits accrued for the current year

Amortization of the Unfunded Actuarial Liability (UAL) - The AL minus the actuarial value of the assets (AVA),⁵ The UAL has two major components:

Prior Service Liability – Increases in benefits for service already earned, which is amortized over the life of the plan not to exceed 15 years.

Actuarial Gains/Losses – These deviations occur because the experience is different from the assumptions used in the forecast. For the liability, it can be because of differences in the mortality, morbidity, salary, or inflation. The plan assets can show a gain/loss if the actual plan returns are different from the plan assumption. The plan amortizes these changes over a period of 7 years.

Excess assets cannot be removed from the plan.

Other minor changes can impact the contribution requirements. Of note, is that removing excess assets from the plan is not possible. In the case of excess assets, the plan funding is limited to the full funding limitation, which may require zero contribution from the plan sponsor.

In the case where the Actuarial Value of the Assets of the pension is below 90% of the plan's current liability, then the plan sponsor must pay an additional charge that places the pension plan on a path towards the 90% threshold.

Credit balances occur when contributions are more than the minimum required amount. In future years, it is possible to offset a funding shortfall with the credit balance in coming years.

The maximum tax-deductible contribution per year into a pension plan is equal to the normal cost plus the current amortization expense of the Unfunded Actuarial Liability. This is constrained by the full funding limitation. In practice, companies, do not contribute any amount more than the

⁵ Per the Pension Plan Protection Act of 2006, the AVA is the value of plan assets calculated at fair market value (FMV) or a smoothing process not to exceed 2 years. If smoothed, the AVA must be between 90-110% of the FMV.

maximum tax-deductible amount, as the absence of the tax shield makes it unpalatable, and there is the possibility of an excise tax on the excess amount.

Liability Assumptions

In measuring the liability, actuaries must make the assumption about the future. There are two types of projections to determine the future liability:

Demographic Assumptions – These include measures that impact the rate of participation in the plan, and include:

Changes in the Labor Force – The number of participants in the pension plan can change when hiring or terminating employees.

Retirement Age – The age of retirement will impact the plan, with a lower (higher) retirement age increasing (decreasing) the mandatory payments.

Life Expectancy – People that live longer will have a higher cost as the benefits to paid will increase as the term of retirement increases. This measured by the rate of mortality in the employee population.

Disability – Employees who become disabled impact the liability by entering the plan sooner than expected or leaving the plan altogether. The rate of morbidity will determine the incidence of disability in the employee population based on the experience of the company.

Of these measures, changes to the labor force are the most impactful. These changes tend to occur during restructuring whether through mergers & acquisitions or cost reduction initiatives. The other measures are more stable in the long-run and tend to vary over time through experience.

Table 2. Impact of Demographic Changes on the Liability Valuation

Demographic Factor	Labor Force	Retirement Age	Life Expectancy	Service Disability
Increases	Higher	Lower	Higher	Higher
Decreases	Lower	Higher	Lower	Lower

Actuarial assumptions for labor force participation, retirement age, mortality, and morbidity drive the liability.

Increases in demographic factors tend to increase the liability, with the retirement age the exception.

Economic Assumptions – These assumptions are used to value the liability and invested assets, and include:

Inflation - Is used to forecast the expected future rate of salary increases and reflects the Consumer Price Index (CPI). It is also a key component in constructing future interest rate assumptions, and asset returns.

Interest Rates – The discount factor is the critical variable in valuing the liability. Components of the interest rate include inflation, a real interest rate, and a risk factor that reflects the investment strategy of the pension plan. The first two are consistent across all pensions plans, while variations in the discount reflect differing risk premium.

Return on the Invested Assets – This variable reflects the average expected return that the asset allocation strategy of the plan will generate. It is composed of the real rate of return, the expected inflation, and the risk premium that will directly scale to the risk of the portfolio. Higher returns are expected to generate a riskier asset allocation strategy.

Changes in Salary – For plans that have final benefits linked to the salary of the plan participants, the final salary is a crucial component. This salary growth reflects expected inflation, productivity of the employees (related to the real growth rate), seniority (a linear progression that is parallel to productivity in a production environment), and other tertiary factors.

While all of the economic factors can materially impact the liability valuation, it is the unexpected inflation component that has the most substantial impact via increases in the future salary of the beneficiaries. In a low inflation environment, the future salary increases are expected to be the smaller component of the expected liability, but as inflation surprises increase, the future salary requirement can rise, and the projected benefit can be expected to increase at a higher rate, and thus the accounting definition of the liability.

Table 3. Impact of Economic Changes on the Liability Valuation

Increasing in economic factors lead to a lower liability valuation, expect changes in salary.

Economic Factor	Inflation	Interest Rates	Risk Premium	Salary
Increases	Higher	Lower	Higher	Higher
Decreases	Lower	Higher	Lower	Lower

Pension Plan Accounting Costs

The Normal Periodic Pension Cost (NPPC) has seven items.

Defined benefit pension plans are liabilities of the offering company that has direct and indirect costs associated with them that eventually enter the accounting statements.⁶ The cost of a pension plan is driven by seven primary inputs assumptions, which are in aggregate are called the Net Periodic Pension Costs (NPPC). The NPPC includes:

Service Cost – This cost is the most direct cost associated with a pension plan and reflects the accrued benefits that occur during the year. This is primarily driven by two factors: the years of service and the salary level. Ending benefits are a combination of years of service and the final salary level of the employee at retirement, and then discounted back to present using the discount rate.

Service cost has the largest magnitude.

Salary Level – Impacts the service cost benefit by the expected growth in salary for the employed during the year. To the extent that salary growth reflects the change in inflation level, the PBO will grow at a median inflation level. In instances where salaries increase on a percentage basis, the liability can grow at an increasing rate in dollar terms in a positive inflation environment.

Years of Service – Years of service for each employee impacts the final benefits and grows with the passage of time. It acts as a linear function of the time of service and provides a constant growth rate in the PBO without changes to the underlying population.

Interest Cost – This reflects the cost of the deferred liability embedded in the pension plan. The calculation is as follows:

Beginning-of-year (BoY) liability
Multiplied by the end of year interest rate used for discounting the liability (typically the Corporate A yield).

Expected Return on Assets the highest variability.

Expected Returns on Pension Plan Assets – The assumed rate of return on invested assets of the pension plan and is derived from the investment assumptions embedded in the asset allocation strategy. This measure is used to counterbalance the expenses, primarily service cost and interest expense. However, pension accounting uses a smoothing method to account for asset

⁶ For further insight, refer to the Financial Accounting Statement No. 87 from FASB that states the specific method for pension accounting for those in the US that follow GAAP.

gains, and they are not immediately recognized.⁷ The calculation of the change is as follows:

End-of-Year (EoY)	Assets
Minus	BoY Assets
Plus	Benefits Paid During the Year
Minus	Contributions During the Year

Amortization of prior gains and losses can materially impact the accounting status.

Changes in interest rates impact the service cost, the interest cost, and the liability valuation.

Amortization of Gains/(Losses) – These items account for changes in actuarial assumptions and enter the pension expense over time as a smoothed value. The usual method is straight-line over the average remaining service life of the employees. The unrecognized portion of the pension G/L accumulates in a separate account called “unrecognized net gain or loss.” Components of this account include:

- Deviations in the asset expected and realized returns
- Changes to the assumption in the PBO liability

Amortization of Prior Service Cost – Changes in the promised benefits to the plan beneficiaries can result in the service cost increasing or decreasing. These are likely the result of unionized labor demands and amortizing the cost over a set period is preferred rather than impact the financial statements immediately.

Curtailments – The result of the reduction in the expected future years of service that plan participants will have and is a result of events related to labor force reductions or ‘freezing’ of the pension plan. The immediate impact is a reduction in the PBO liability.

Settlement – This action reduces the future liability of the plan irrevocably. This action includes a buy-out of the current plan members with a lump-sum payment, or the purchase of an annuity to offset- the future cash flows.

While these items are expected, in general, to result in an expense for a given year, the summation may result in a ‘negative’ expense. When the total is negative, the income statement will reflect the value.

⁷ The International Financial Reporting Standards (IFRS) are expected to be adopted in the US in 2011, which will result in mark-to-market accounting for the assets. However, implementation may be gradually phased in over a few years.

Interest Rate Impacts

Three significant accounting items impacted by interest rates in pension accounting, which are the following:

Changes in interest rates impact the service cost, the interest cost, and the liability valuation.

Service cost – Interest rates are used to discount accrued future service costs, and thus have a negative relationship between the interest rate and service cost.

Interest Cost – Interest rates are used to determine the Interest Cost expense in the financial statements and have a direct positive relationship. Increasing rates will lead to higher interest expense costs

Liability Valuation – Interest rates have a direct negative relationship between the liability valuation and the change of interest rates. Increasing interest rates will result in a lower present value for the liability.

In general, since the service cost is lower than the expected total liability, higher interest rates will have the impact of lowering the liability at a higher magnitude than the service cost. Thus, all else equal, higher rates result in a lower pension expense.

Table 4. Impact of Interest Rate Changes on Accounting Measures

Increasing interest rates decrease the service cost and liability, while the interest cost grows.

Interest Rate	Service Cost	Interest Cost	Liability Value
Increases	Lower	Higher	Lower
Decreases	Higher	Lower	Higher

In an active pension plan, the service cost per year can account for a 2% or higher increase in the liability per year as new benefits accrue to the pension plan. While changes in the liability valuation will dominate the service cost impacts on the income statement, it is the change in the liability that has the most significant effect on the balance sheet.

Table 5. Impact of Interest Rate Increase on Accounting Expense

Duration 20	Service Cost	Interest Cost	Net Cost	Liability Value
Interest Rate = 6%				
Current Liability	2.00	6.00	8.00	100.00
Interest Rate = 7%				
Scenario Liability	1.20	5.86	7.06	83.77
Change	(0.80)	(0.14)	(0.94)	(16.23)

Higher interest rates are beneficial to the plan sponsor in an accounting context.

The impact of a 100-basis point increase in rates shows that a lower Service Cost offsets the rise in Interest Cost. Notable is the dramatic drop in liability value by about 16% (Table 5). From this and the preceding discussion, we can derive the following general statement for pension accounting under FASB:

Interest rate increases are favorable for both the income and balance sheet

This outcome is the general case, and there are cases where a pension plan with a high proportion of retirees and older participants will reverse this general rule, but that instance is currently a rare case.⁸

Other Pension Plan Accounting Items

Contributions in excess of the minimum are accrued.

Accrued or Prepaid Pension Costs - A balance sheet asset can appear in the financial statements when there is an accrued or prepaid pension cost, which is the accumulated amount that company contributions exceed the NPPC. In the case when the fair market value (FMV) of assets is less than the ABO, there may be additional amounts that the company is required to reflect on its balance sheet. It is not required to indicate these items in the income statement.

⁸ The example is expected to increase in frequency as the demographics shift over the next decade and the transition from defined benefit to defined contributions pension plans continues.

Additional funding is required when the ABO is greater than the plan assets.

Additional Minimum Liability (AML) – When the liability (the ABO) is higher than the plan’s assets, then the deficiency is reflected on the balance sheet as an unfunded liability, the AML. The prepaid pension or pension cost can be applied to the gap to reduce the AML on the balance sheet. When there is no deficiency, there is no liability recorded.

Intangible Asset – In the instance when recording an Additional Minimum Liability, the liability can be offset by an asset equal to the total of the unrecognized prior service costs, and the transition obligations. This action captures the future goodwill of the employees, who have deferred benefits into the future.

Deficient funding flows through OCI and impacts the income statement.

Reduction in Other Comprehensive Income (OCI) – When the Additional Minimum Liability is higher than the intangible asset, then the difference results in a decrease to OCI, and is a means to reflect the reduction in company value from the unfunded pension liability.

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