GREAT LAKES ADVISORS
THE TIME VALUE OF MONEY

PRESENTED BY:

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DISCUSSION TOPICS

THE TIME VALUE OF MONEY

This session will explore the eighth wonder of the world, compounding interest, and will seek to help the trustee understand this concept through the application of ‘future value’ (accumulation phase) and ‘present value’ (payment phase) of a simple annuity.
COMPOUNDING INTEREST

COMPOUND INTEREST IS THE EIGHTH WONDER OF THE WORLD. HE WHO UNDERSTANDS IT, EARNs IT . . . HE WHO DOESN’T . . . PAYS IT!

Albert Einstein
FUN WITH FINANCE

Cornelius Vanderbilt – Built the ‘Breakers’ as a summer home, he never lived in it. Erected in 1895 at a cost of $7,450,000. What is the inflation adjusted cost of this home today?

- Solving for FV (Future Value):
  - $7,450,000 = PV (Present Value)
  - 0 = PMT (Payment)
  - 2.83% = RATE (Annualized Inflation)
  - 122 = NPER (Years)
  - Inflation adjustment made at the end of the Period
  - $224,272,612 = FV (Future Value)

A buyer wants to purchase this home, at its current FV with a 20% down payment and to borrow the balance over a 30 year mortgage at 4.25%. What is the monthly payment?

- Solving for PMT (Payment):
  - 20% Down = $44,854,522
  - $179,418,088 (Mortgage Amount) = PV
  - $0 = FV (Loan will be paid in full)
  - 4.25% = RATE (APR)
  - 360 = NPER (Months 30 x 12)
  - Payments made at the end of the Period
  - $882,629 = Monthly Payment

Total Loan Cost
$318M
FUN WITH FINANCE

Hypothetical Thirty Year Treasury Bond

- $1,000,000 PAR -10% Coupon - Issued Winter - 1982
  - Price in Winter 1984 when current yields were 11.7%
    - Solving for Current Price (PV):
      - 11.7% = Rate
      - $1,000,000 = FV
      - $100,000 = Annual Coupon
      - 28 = Years Remaining
      - Payments made at the end of the Period
      - $861,259 = Current Price (PV)
      - Bond is trading at a Discount – LESS THAN PAR
  
- Price in Winter 1986 when current yields were 7.4%
  - Solving for Current Price (PV):
    - 7.4% = Rate
    - $1,000,000 = FV
    - $100,000 = Annual Coupon
    - 26 = Years Remaining
    - Payments made at the end of the Period
    - $1,296,444 = Current Price (PV)
    - Bond is trading at a Premium – MORE THAN PAR

Used for illustrative purposes only and may vary based on circumstances.
FUN WITH FINANCE

Was IBM a good investment?
• Solving for RATE:
  • $16.44 = PV (Price 12/12/1980)
  • $156.74 = FV (Price adjusted for Splits and Dividends on 12/12/2017)
  • 0 = Dividends re-invested
  • 36 = Years
  • Payments made at the beginning of the Period
  • 6.46% = RATE (Annualized Return)

What about Apple (AAPL)?
• Solving for RATE:
  • $.51 = PV (Price 12/12/1980)
  • $171.70 = FV (Price adjusted for Splits and Dividends on 12/12/2017)
  • 0 = Dividends re-invested
  • 36 = Years
  • Payments made at the beginning of the Period
  • 17.54% = RATE (Annualized Return)

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FUN WITH FINANCE

In 1984, NY Detective Robert Cunningham was at Sal’s Pizzeria near Yonkers when he made a deal with his server Phyllis Penzo, that instead of a tip they would split a $1 lottery ticket. They won $6 million and split $285,715-a-year for the next 20 years! How much would you need today to cover the payment at a 5% earnings rate?

Solving for PV (Present Value):
$0 = FV (Future Value)$
$285,715 = PMT (Payment)$
5% = RATE (Annualized)$
20 = NPER (Periods - Years)$
Earnings at the end of the period
$3,560,640 = PV (Present Value)$

You will be shocked, a 99% Annual Interest Rate!

$6 million payout
A MILLION DOLLAR WINNER

YOU WIN THE LOTTERY!!!!

You have two options to receive your $1,000,000:

1) **Simple Annuity (Pension)**
   A set annual payment for a set number of years into the future, or

2) **Lump Sum (DROP)**
   a discounted cash payment now.

The Lottery has two ways to provide for the payout:

1) **Pay As You Go**
   Payouts funded from ‘Revenue’ or,

2) **Create an ‘Asset Pool/Trust’**
   funded from actuarial determined payments

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SIMPLE ANNUITY

CALCULATING THE $1,000,000 ANNUITY:

- Solving for a simple annuity:
  - 20 years = Contract Term
  - $50,000 = Annual Payment
- Cash received by the winner over the contract term $1,000,000
LUMP SUM

CALCULATING THE LUMP SUM OR PRESENT VALUE:*

- Solving for Present Value (PV):
  - $50,000 = PMT (Annual Payment)
  - $0 = FV (Future Value)
  - 7% = RATE (Discount Rate)
  - 20 years = NPER (Number of Periods)
  - Payment at the beginning of the period
- Cash lump sum amount (PV) = $566,780

*Present Value is the current worth of a stream of cash flows at a specified rate of return.
CREATE AN ASSET POOL/TRUST

ASSET POOL (PENSION TRUST FUND) REQUIRES:

• Current Assets - Net Present Value (NPV)

• Systematic Contributions – Payment (PMT)

• Expected amount (liability) in the future - Future Value (FV)

• Expected Rate of Return or Discount Rate (RATE)

• Time Estimate – Periods (NPER)

ACCUMULATION PHASE  20 YEARS (EXAMPLE)  PAYMENT PHASE  20 YEARS (EXAMPLE)
ACCUMULATION PHASE

CONTRIBUTIONS REQUIRED TO FUND THE POOL:

• Solving for the required annual (Payment):
  • $566,779 = FV (Future Liability)
  • $0 Beginning Value = PV
  • 7% = RATE (Discount Rate)
  • 20 Years = NPER (Years)
  • Payment made at the end of the Period
  • Annual payment = $13,825
    • 20 * $13,825 = $276,508 or 49%

Note: Enter the known values and click the Button on the right to calculate the corresponding unknown value.
CALCULATING A TYPICAL PENSION PAYMENT:

- A normal retirement with no survivors
  - Final Average Pay = $83,334
  - Creditable Service = 20 Years
  - Creditable Service Formula = 3%
  - Retirement @ 54 – Death @ 74 years = 20 Years
  - Pension Annuity = $83,334 x 60% = $50,000

- Solving for the amount to fund the benefit (PV):
  - $50,000 = PMT (Pension Annuity Amount)
  - $0 = FV (Value at Death)
  - 7% = RATE (Actuarial Rate of Return)
  - 20 years = NPER (Life Expectancy)
  - Payment at Beginning of the period
  - Actuarial Equivalent Liability = $566,780 (PV)

- 8% Actuarial Rate of Return requires a PV of $530,180 – LESS
- 6% Actuarial Rate of Return requires a PV of $607,906 - MORE
EXPECTED COST

ACCUMULATION PHASE
• Annual required contribution = $13,825.42
  • 20 Years * $13,825.42 = $276,508

PAYMENT PHASE
• $566,780 = Annuity Present Value
• 20 Years = Life Expectancy
• Retirement Annuity = 20 Years of $50,000

EXPECTED COST
• 20 Years of Payments * $13,825.42 = $276,508
• Next 20 Year Payout = $1,000,000
• Total 40 Year Earnings Attribution - 72%
  $1,000,000 - $276,508 = $723,492

THE MIRACLE OF COMPOUNDING INTEREST!

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ILLUSTRATION – DEFINED BENEFIT PLAN

PROPERLY FUNDED DEFINED BENEFIT PLAN ILLUSTRATION

Plan Sponsor Contribution Valve

Investment Return Gauge

Actuarial DIP STICK

Investment pump pressure reflects a realistic return assumption
‘LOW RISK’

ILLUSTRATION – DEFINED BENEFIT PLAN

UNDER-FUNDED DEFINED BENEFIT PLAN ILLUSTRATION

Low funding drives investment pump pressure to extreme levels! ‘More Risk’

A FUNDING REALITY

REDUCE OUTFLOWS

• Employer
  • Seek legislative relief on benefit structures
  • Diminish Collective Bargaining Rights
  • Reduce salary
  • Provide benefits to less people (layoffs)
  • Freeze Plan/Liability

• System
  • Redefine variable salary supplements (spikes)
  • Reduce/limit inflation protection (Cost of Living Increases)
  • Define work-related disabilities and survivor benefits more rigorously
  • Consolidate to reduce expenses

• Employee
  • Accept benefit reductions
  • Accept Tiering for new employees
  • Higher hurdle for future benefit enhancements
A FUNDING REALITY

INCREASE INFLOWS

- Employer
  - Increase tax rate
  - Increase tax base
- System
  - Increase investment return
  - Increase risk
- Employee
  - Increase contributions

ACTUARIAL & ACCOUNTING CHANGES (New Dip Stick)

- ‘Mark to Market’
- Discount Rate Changes (GASB 67/68)
- Smoothing
- ‘Market Value Liability’

JUDICIAL & LEGAL CHALLENGES

- Constitutional Protection
- Municipal Bankruptcy
- Sovereign Bankruptcy
BIOGRAPHY

Kelly Weller
Managing Director

Kelly Weller is a Managing Director of Client Service and Sales for Great Lakes Advisors and serves as a client relationship manager for the firm. Kelly began his industry career in 1994 and specializes in investment solutions for public, non-profit, corporate, and multi-employer endowment, foundation, and retirement plans.

Prior to joining the firm in 2012, he held similar positions with PNC Capital Advisors, LLC and JP Morgan Asset Management Company. As a former public fund trustee and current Board Advisor to the National Conference on Public Employee Retirement Systems, Kelly brings a deep relationship network and practical experience to the client service team.

Kelly holds a bachelor’s degree from Illinois College, an MBA from the University of Illinois (Springfield), and is also a Certified Public Accountant. He also holds FINRA Series 7, 63, and 65 Licenses.

ABOUT GREAT LAKES ADVISORS

Founded in 1981, Great Lakes Advisors is headquartered in Chicago, Illinois with an additional office in Tampa, Florida. The firm has $9 billion in assets under management and advisement and offers a wide range of fixed income and equity strategies across all market capitalizations. We have deep portfolio management capabilities within ESG, Socially Responsible, Tax-Managed, and Customized account solutions. Our clients include public funds, multi-employer plans, corporations, religious communities, endowments/foundations, health care plans, and private wealth management clients.
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Great Lakes Advisors, LLC claims compliance with the Global Investment Performance Standards (GIPS®). A complete list of firm composites and performance results, and the policies for valuing portfolios, calculating performance, and preparing GIPS compliant presentations are available upon request by calling 312-553-3700.