Economic Design of Cash Balance Pension Plans

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Outline

- Intuition
- Model Approach
- Transparent Subsidiary Model
- Implications
- Impediments to Implementation

Intuition

- ***Economic Transparency***
- ***Arbitrage in modern finance***
- ***Transparent financial subsidiary***

Model Approach

- ***Fischer Black - adjust corporate balance sheet***
- ***Irwin Tepper - adjust shareholder portfolios***

Model Approach

- ***Assumptions - re: markets***
  - A.1 Sponsor shares marketed
  - A.2 Shareholders diversify
  - A.3 Shareholders borrow/lend at market rate
  - A.4 No transaction costs
  - A.5 Plan assets marketed
  - A.6 Sponsor & plan ongoing; no bankruptcy
  - A.7 Transparency: Sponsor m/v reflects the marginal value of marketed securities held

Model Approach

- ***Assumptions - re: taxes***
  - A.8 Pension plan returns not taxed
    - contributions to plan are deductible at corporate rate, τ_c
    - personal fixed income tax rate, τ_{pb} > personal equity tax rate, τ_{ps}

Model Approach

- ***Assumptions - re: CB plan***
  - A.9 Plan demographics modeled with no uncertainty
  - A.10 Investment crediting rate set annually in advance equal to return on a benchmark portfolio of marketed securities

Model Approach

- ***Assumptions - re: employee compensation***
  - A.11 Compensation is set without regard to the investment crediting benchmark and without regard to plan assets and returns

Transparent Subsidiary Model

Augmented Balance Sheet (at market value)	
Assets	Liabilities
A_P = Pension portfolio	L_P = PV pension obligations
A_B = Corporate assets	L_B = Corporate liabilities
	$E = E_P + E_B$ = Equity

$$E = A_B - L_B + A_P - L_P$$

Transparent Subsidiary Model

- ***Without tax considerations:***

  – *R.1* *Shareholders establish aggregate portfolios that reflect indifference to the allocation of assets and liabilities within pension plans*

Transparent Subsidiary Model

- ***Without tax considerations:***
  - *R.2 If benchmark = marketed instrument +/- K => loss/gain to shareholder = K*
  - *Examples:*
    - T-bill + 100 bp => 100 bp loss
    - S&P - 100 bp => 100 bp gain

Transparent Subsidiary Model

- ***With tax considerations:***
  - Let:
    - α = % assets in equities, balance in T-bill
    - β = % liabilities to equities, balance to T-bill
    - r = T-bill return
    - $\{\alpha,\beta\}$ be an asset/liability benchmark pair
    - $\{0,0\}$ be the base case

Transparent Subsidiary Model

- ***With tax considerations – (Tepper version)***
  - S/h tax (base case): $\tau_{ps}(1-\tau_c)rE_P$
  - $\{\alpha,\beta\}$ tax increase: $(\tau_{pb}-\tau_{ps})(1-\tau_c)r(\alpha Ap-\beta Lp)$
  - Taxes increase with α and decrease with β. Thus:
  - *R.4: Optimal {0,1} plan invests entirely in T-bills and credits equity returns on employee account balances!*

Transparent Subsidiary Model

- ***With tax considerations – (Black version)***
  - Plan sells \$1 equity; sponsor buys $\$(1-\tau_c)$ of own stock
  - Plan buys \$1 bonds; sponsor borrows $\$(1-\tau_c)$ to support stock purchase
  - Corporate after-tax annual gain: $r(1-\tau_c)\tau_c$
  - Shareholder after-tax gain of: $r(1-\tau_c)\tau_c(1-\tau_{ps})$

Transparent Subsidiary Model

- ***Black and Tepper gains merely offset losses***

  – *R.6* *Our base case, {0,0}, is identical to the Tepper and Black proposals is identical to cash compensation or DC plan.*

Implications

- ***A numerical example***
  - Let:
    - $\tau_{pb} = 40\%$
    - $\tau_{ps} = 15\%$
    - $\tau_{c} = 35\%$
    - $\alpha = 60\%$
    - $\beta = 0$
    - $A_P = L_P =$ \$1 billion
    - $r = 5\%$

Implications

- ***A numerical example***
  - Change:
    - $\alpha = 0, \beta = 1$
  - Annual tax saving:
    - $(.4 - .15)(1 - .35)r(.6A_P) = 9.75\%$ of rA_P
    - $(.4 - .15)(1 - .35)rL_P = 16.25\%$ of rL_P
  - After-tax perpetuity present value:
    - $(.0975A_P + .1625L_P)/(.6) = \$433$ million

Implications

- ***A numerical example***
  - Suppose r = 5%, crediting rate = 6%
    - Additional $184 million
  - Total after-tax s/h PV loss from {α=.6,β=0,+1%} plan:
    - $433 + $184 = $617 million
  - Compare to after-tax value of $1 billion of assets:
    - (1-.4)(1-.15)$1 billion = $552.5 million

Implications

- ***Employee choice plans***
  - Let employees choose T-bills, bond index, equity indices, company stock. Some s/h advantages:
    - Company stock allows Black version thus benefiting nontaxable as well as taxable shareholders.
    - Index equity choices allow shareholder tax gains to be achieved using the Black or Tepper approaches.
    - Employee utility enhancements derived directly from their choices inure to shareholders in part.

Implications

- ***What NationsBank has done***

  - By making $\alpha A_P - \beta L_P > 0$, they have inflicted a loss upon themselves in comparison to a DC plan where $\alpha A_P - \beta L_P = 0$.

Impediments to Implementation

- ***No one implements Tepper-Black tax arbitrage. Why not? Three observations:***
  - Anticipating returns to risk => a $1 pay credit costs < $1 in an $\{\alpha,0\}$ plan; > $1 in a $\{0,\beta\}$ plan.
  - Smoothing takes volatility out of pension plan equity holdings; makes the arbitrage not viable.
  - Legal separation of plan and sponsor challenges financial sub model; threatens lenders.

Tables

Table I – Pay Credits and FAS 87 Expense

Age x+t	Pay Credit	{α,0}		{0,0}		{0,1}	
		Expense	Ratio	Expense	Ratio	Expense	Ratio
26	1000	682	68%	682	68%	1642	164%
30	1194	809	68%	887	74%	2133	179%
35	1491	988	66%	1231	83%	2960	199%
40	1862	1184	64%	1707	92%	4107	221%
45	2325	1383	59%	2369	102%	5699	245%
50	2903	1558	54%	3287	113%	7908	272%
55	3624	1662	46%	4561	126%	10972	303%
60	4525	1613	36%	6329	140%	15224	336%
65	5650	1276	23%	8782	155%	21124	374%

Table II – Pay Credits and PUC Contributions

Age x+t	Pay Credit	{α,0}		{0,0}		{0,1}	
		Expense	Ratio	Expense	Ratio	Expense	Ratio
26	1000	293	29%	682	68%	1642	164%
30	1194	415	35%	887	74%	2133	179%
35	1491	642	43%	1231	83%	2960	199%
40	1862	993	53%	1707	92%	4107	221%
45	2325	1536	66%	2369	102%	5699	245%
50	2903	2375	82%	3287	113%	7908	272%
55	3624	3672	101%	4561	126%	10972	303%
60	4525	5679	126%	6329	140%	15224	336%
65	5650	8782	155%	8782	155%	21124	374%

Table III – Pay Credits and TUC Contributions

Age x+t	Pay Credit	{α,0}		{0,0}		{0,1}	
		Expense	Ratio	Expense	Ratio	Expense	Ratio
26	1000	429	43%	1000	100%	4052	405%
30	1194	559	47%	1194	100%	4192	351%
35	1491	778	52%	1491	100%	4375	293%
40	1862	1083	58%	1862	100%	4565	245%
45	2325	1507	65%	2325	100%	4764	205%
50	2903	2097	72%	2903	100%	4972	171%
55	3624	2918	81%	3624	100%	5188	143%
60	4525	4060	90%	4525	100%	5414	120%
65	5650	5650	100%	5650	100%	5650	100%