Solution 1

(a)

- Inadequate front-end control – can't inventory, can't satisfy regulatory.
- Backlog of unpaid claims
  - Internal stress
  - Duplicate billing
  - Regulatory complaints
  - Miss recent trends in claims in claims and IB/IR.
- Clash between use management claims
  - Use management takes time, slows down claims.
- Informal interpretation of benefits
- System errors in edits
- Corrupted data files
  - Incorrect, outdated codes
- Inadequate support for pending/suspended claims
  - Must have guidelines since claims are time-sensitive.
- Delayed claims can lead to regulatory fines and punitive damages.
- Overpayments increase claims costs.
- Underpayment leads to corrects, increased administrative costs.
- Problems between member and provider.

(b)

- Overall accuracy – Percentage of no errors in either amount or who paid to.
- Payment accuracy – Percentage that has the overpayments and underpayments.
- Financial accuracy $= \dfrac{\text{Overpayments + Underpayments}}{\text{Correct total payments}}$
- Improve quality through technology support.
- Training
- Feedback from claims
- Up-to-date guidelines.
- Guidelines on process for pended claims
- Personal development programs
- Commercial packs on terminology.

(c)

- Advanced technology to aid processing -- helps reduce employees.
- Software that catches bundling of claims.
- Locate to low-cost area.
- Make sure that all requirements to claim have been met.
  - Utilization
  - Pre-existing exclusion
  - Referral
  - Pre-authorization
  - Have limits been met?
- Can claim be contested?
- Settle disability claims.
- Use effective rehabilitation program.
- Use disease and case management.

(d)

- Initially:
  - Lack of expertise
  - Outsourcing all systems needed
  - Long time to reach size for efficiency.
- Long-run:
  - Regulatory complains
  - Outdated systems
  - Carve-outs
  - Poor performance
  - Capitated providers
  - Turnover

Solution 2

(a) Concerns include:

- Giving union members choice diminishes the role of the union.
- Too complex benefit design for union members to understand.
- May be perceived as employer's attempt to shift higher costs to union members.

Alternatives:

- Offer the same flexible plan that has been successful with salaried employees to union.
- Keep the union plan around as another option.
- Employer should have shown past efforts to lower health costs so this isn't assumed to be shifting costs.
- Employer can share some of health care savings from moving to flexible benefits programs with union.

Could offer different types of flexible plans:

- Healthcare expense account
- Core and credits and options
- Optional up/down.

(b) Measures of claim quality:

- Need good inventory process for incoming claims.
- Need to track TAT (turnaround time) and track where pended claims are in the process.
- Claim area should have a voice in product development since they know the features that are difficult to administer.
- Feedback by claims area on organizational structure can make claim administration more effective.
- Need control process.
- Need to review control process periodically.

Measures to increase quality:

- Administrative difficulty
  - Track choices
  - Track options
  - Track restrictions in moving from one plan.
- Educating employees costs money.
  - The more options and combinations that can be selected, the more possible confusion.
- Claim administration
- Anti-selection
  - Limit movement among plans.
  - Offer healthcare expense account for predictable benefits.
  - Higher subsidy of benefits for higher participation.

- Combine more and less predictable costs together.
- Do not give full amount back if opt-out

- Opt-out option:
  - Allow entire opt out?
  - Make employee show evidence of coverage or spousal coverage?
  - Make employee take minimum coverage?
- Selection allows better cost control, cost-management features.
- Consider funding pre-tax credits.
- Selection allows more benefit choices and satisfies needs of more employees.

(c) Basic:

- April 5 – \$125, deductible down \$125
- June 10 – \$180, deductible exhausted

} Palpatine pays \$300

Still \$5 split 75/25, so Palpatine pays \$1.25

- July 18 – \$180, maximum \$150. Palpatine pays \$30.
- July 19 – \$180, pays \$30.
- July 20 – pays \$30.
- September 22 – \$60 drug. Palpatine pays 25% or \$15.
- December 5 – Vision not covered.

$$\$300 + 1.25 + 30 \times 3 + 15 + 280 = \$686.25$$

I assume deductible is cumulative and not per-incident.

Enhanced:

- April 5 – Palpatine pays \$100 for deductible, pays 10% of remaining \$25 or \$2.50.
- June 10 – Pays 10% of \$180 = \$18.
- June 18, 19, 20 – \$250 per day covers the \$180 per-day hospital charges so no out-of-pocket costs.
- September 22 – 10% of 60 = \$6.
- December 5 – Pays 280 –200 = \$80.

$$\$100 + 2.50 + 18 + 6 + 80 = \$206.50$$

Solution 3

(a) Information required for durational study:

- Experience period for small group business, including number of lives, premium, and claim cost (incurred claims)
- Dates of issue for each group
- Medical underwritten business versus guarantee issue
- Medical underwritten (short form versus long form)
- Pre-existing condition limitations
  $\Rightarrow$ Separate by None, 12-month, etc.
- Duration since issue or last time group was underwritten

(b) Potential Limitations:

- Number of months of experience
- Age/sex and geographic mix
- Lack of exposures (members) in various cells

Normalize (adjust) data for:

- Benefits
- Area
- Demographic
- Trend

(c) Steps to durational study:

- Normalize for age/sex/area, etc and trends
- Divide incurred claims by normalization factor
- Divide adjusted incurred claims by enrollment
- Divide adjusted PMPMs by 2nd year PMPM

Trend = 13.5% annually
Age/sex increase 1% annually
No other changes in block

Year	Age/Sex Norm.	× Trend	= Adjustment
1	1.00	1.00	1.00
2	1.01	1.135	1.146
3	$(1.01)^2$	$(1.135)^2$	1.314
4	$(1.01)^3$	$(1.135)^3$	1.506
5	$(1.01)^4$	$(1.135)^4$	1.727

(c) Continued

Incurred Claims	Adjusted Inc Clms = Inc Clms × Adjustment	MM Enrollment	PMPM = Adj Inc Clms / Enrollment	Durational Factor = $PMPM_y$ / $PMPM_2$
16,896,000	16,896,000	240,000	$70.40	0.640 = 70.40 / 110.03
24,210,912	21,126,450	192,000	$110.03	1.00
25,533,845	19,432,226	153,600	$126.51	1.150
27,489,027	18,253,006	122,800	$148.64	1.351
26,143,327	15,138,001	98,304	$153.99	1.400

Solution 4

(a)

Group #	(a) Average Employee Exposure	(b) Total Exposure EE Months	(c) Total Premium	(d) Specific Excess Px $20.00	(e) 100% QS Px	(f) Retained QS Premium 70%	(g) Ceded QS Premium 30%	(h) % Ceding Allowance 20%	(i) Claims < $50K	(j) Retained Claims < $50K 70%
1	25	300	54,000	6,000	48,000	33,600	14,400	2,880	34,000	23,800
2	100	1,200	282,000	24,000	258,000	180,600	77,400	15,480	186,000	130,200
3	300	3,600	777,600	72,000	705,600	493,920	211,680	42,336	567,000	396,900
4	1,500	18,000	3,852,000	360,000	3,492,000	2,444,400	1,047,600	209,520	2,520,000	1,764,000
5	2,500	30,000	8,520,000	600,000	7,920,000	5,544,000	2,376,000	475,200	6,265,000	4,385,500
6	3,000	36,000	7,560,000	720,000	6,840,000	4,788,000	2,052,000	410,400	5,336,000	3,735,200
	7,425	89,100	21,045,600	1,782,000	19,263,600	13,484,520	5,779,080	1,155,816	14,908,000	10,435,600

Pre-Tax Operating Gain: = Retained Premium – Retained Claims (j) – Ceding Commission – Operating Expenses +Investment Income.
= $13,484,520 – $10,435,600 + $1,155,816 – $3,177,886 + $404,536
= $1,431,386

Retained Premium: = Total Premium (c) – Specific Excess Premium (d) – Ceded quota share Premium
= $21,045,600 – $1,782,000 – $5,779,080 = $13,484,520

Ceded Quota Share Premium: = 30% × [Total Premium (c) – Specific Excess Premium (d)]
= 30% × [$21,045,600 – $1,782,000]= $5,779,080

Retained Claims (j): = $10,435,600

Ceding Commission: = 20% × Ceded Quota Share Premium (g)
= 20% × $5,779,080 = $1,155,816

Operating Expenses: = 15.1% × Total Premium (c)
= 15.1% × $21,045,600 = $3,177,886

Investment Income: = 3% × Retained QS Premium (f)
= 3% × $13,484,520 = $404,536

Solution 4 – Cont'd.

(b)

No Reinsurance:	
1. Premium	$21,045,600
2. Claims	$17,345,000
3. Expenses	$3,177,886
4. Investment Income (3% or premium)	$631,368
5. Pre-tax Operating Gain (1–2–3+4)	$1,154,082
6. Surplus held (30% of premium)	$6,313,680
7. Pre-tax ROE (gain/surplus)	18.3%
8. Greater than 25% target?	No
With Reinsurance:	
1. Pre-tax operating gain (from (a))	$1,431,386
2. Retained Premium (from (a))	$13,484,520
3. Surplus held (30% of premium)	$4,045,356
4. Pre-tax ROE (gain/surplus)	35.4%
5. Greater than 25% target?	Yes

(c)

- Statutory vs. GAAP
  - GAAP reserves may be much less than statutory.
  - Helpful to look at ratio of earnings to premiums.

- Underwriting gain vs. operating gain
  - Operating gain includes investment income.
  - Look at loss ratios, ratio of incurred claims to earned premium.
  - Adjust for distortions (reserve adjustments, seasonality, cyclicity).

- Economic value added
  - Defined as excess profit (or ROE) above its cost of capital.
  - Helps attractiveness of opportunities that add value but may not increase ROE.

- Return on Investment
  - ROI is ratio of profit to capital invested
  - Not a good measure of service businesses. Can use return on sales or profit per employee instead.

Solution 5

(a)

- Projection Cells: Should be relatively homogeneous and reflect the major characteristics of the business. Should reflect differences used in rating structures.

  Examples:
  - HMO vs. PPO vs. Indemnity
  - Group vs. Individual
  - Community-rated vs. Experience-rated.

- Time Period Projected:
  - Should be $\leq$ two years for predicting results
  - Up to five years for determining effect of possible action.

- Base Period:
  - Base period date should be 12 months to cover seasonal variations.
  - Should allow at least three months for claims run-out.

- When to Run Model: Should allow six months to test and apply actions suggested by the model, so June 30 is a good run date for a calendar-year plan. This allows for presentation to the Board in November as well.

- Comparison to Actuals:
  - Results should be compared to actuals.
  - Financial estimates should be restated where possible (e.g., IBNR, provider liability estimates, . .)
  - Should run model with a start date = base period end date and compare to actuals between then and current date.

(b)

- Need trend assumption, information on changes in demographics (age, sex, region) or benefit changes, provider or reimbursement mechanism changes.
- IBNR estimates in Table 6 should be restated to improve A/E comparisons.
- Should have different scenarios to test. This is where the model becomes useful – testing various actions that could be implemented.

Solution 6

(a)

	Paid Hospital Claims From Table MM-4b	Original Factor		Membership
11/01	39,200 / 4,100 =	9.56098		980
10/01	35,600 / 7,200 =	4.94444	⇐ Lo	976
9/01	38,700 / 3,400 =	11.38235	⇐ High	974
8/01	33,500 / 5,400 =	6.20370		974
	Average	**8.02287**		

(i) $\frac{(9.56098 + 6.20370)}{2} = 7.88234$

(ii) Geometric Mean $= (9.56098 \times 4.94444 \times 11.38235 \times 6.20370)^{(1/4)} = 7.60109$

(iii) $\frac{39,200 + 35,600 + 38,700 + 33,500}{4,100 + 7,200 + 3,400 + 5,400} = 7.31343$

(iv) $\frac{\frac{39,200}{980} + \frac{35,600}{976} + \frac{38,700}{974} + \frac{33,500}{974}}{\frac{4,100}{980} + \frac{7,200}{976} + \frac{3,400}{974} + \frac{5,400}{974}} = 7.31236$

(b)

- Average Development Factors
- Simple Averaging:
  - 3, 6, or 12 months averages
  - 3 months has advantage of using more current data
  - 12-month average is typically smoother, but may not recognize current trends.
- Removing Bumps – (No additional points for throw out high/low)
  - Use 6 of last 8 (or 6 of 10) to compute average.
  - Removing shock claims before computing factor
  - Cannot ignore large claim completely.
- Weighted Averaging:
  - Sum of the digits
  - Squared sum of the digits
  - Constantly declining percentage
  - More credibility to more recent development factors.
- Other means – harmonic mean:
  - Compute mean of the reciprocals of each data point and take reciprocal of that value.

Solution 7

(a)

	High $250 Option 1	Low $500 Option 2	Total
Total Claims	5,463,000	795,000	6,258,000
Total No. of Employees	2,400	600	3,000
Months	12	12	12
Claim Cost PEPM*	189.69	110.42	173.83

*For period 7/1/00 to 6/30/01.

Expected Claim Trend		Months	
2001	0.90%	12	7/1/00 to 6/30/01, midpoint 1/1/01
2002	1.20%	8	Renewal 3/1/02 to 3/1/03, midpoint 9/1/02

$(1+0.009)^{12} \times (1+0.012)^{8} - 1 = 22.5\%$ Use to trend claim experience to renewal period (midpoint to midpoint).

	High $250 Option 1	Low $500 Option 2	Total
Expected claim cost PEPM	232.37	135.26	**212.95**

(b)

				Employees
Option 1 ($250)				
Subgroup 1	80%	199.17	5% higher	1,920
Subgroup 2	20%	151.75	20% lower	480
Option 2 ($500)				
Subgroup 1	90%	104.90	5% lower	540
Subgroup 2	10%	160.10	45% higher	60

Benefit factors (Table MM-2b 9.)

- $250 deductible 0.75
- $500 deductible 0.70

If subgroups 2 switch options:

Rev. Option 1 ($250)				
	199.17	1,920		Trend
Benefit adjustment 0.75/0.70	171.54	60		
New overall cost	198.33	4.6%	Increase to Option 1	$(1+0.046)\times(1+0.225)=28.1\%$
Rev. Option 2 ($500)				
Benefit adjustment 0.70/0.75	141.63	480		
	104.90	540		
New overall cost	122.18	10.7%	Increase to Option 2	$(1+0.107)\times(1+0.225)=35.6\%$

Antiselection magnifies the observed trend above the true level of underlying health care trends.

With subgroup 2 switching options:

$199.17\times(1+0.225)=243.99$	1,920		
$171.54\times(1+0.225)=210.14$	60 switched options		
$141.63\times(1+0.225)=173.50$	480 switched options		
$104.9\times(1+0.225)=128.50$	540		
	211.24	21.521%	−1.0%

Overall trend is −1% less since more employees switched into the lower option plan.

(c)

(i)

	Current Composite Rate per EE	70.0% Current ER Contribution	Total ER Contribution	Current EE Contribution
Option 1	$225 × 0.7 =	$157.50	× 2,400 ees = $378,000	$67.50
Option 2	$150 × 0.7 =	$105.00	× 600 ees = $63,000	$45.00
			$441,000	

$$PEPM = \frac{3000}{\$147.00} \text{ Fixed \$ ER Contribution}$$

	Resulting EE Contribution	Change
Option 1	$225 – $147 = $78	$10.50
Option 2	$150 – $147 = $3	($42.00)

(ii)

What would happen?

- The employer pays the same amount in both schemes.
- Employees in Option 1 would pay more under the fixed-dollar cost scheme
- Since it cost more, fewer employees will buy Option 1.
- It is unlikely that sick employees will switch from the high-benefit plan since the extra contribution is cheaper than the additional deductible.
- The shift of healthy employees from the high to the low plan causes adverse selection.
- Over time, adverse selection will raise the cost of Option 1.

Solution 8

(a) Refund =

	Formula	Group 4	Group 5
	Prior balance	60,000	25,000
+	Investment income	0	0
+	Premium	3,852,000	8,520,000
−	Claims charged*	3,046,680	7,142,800
−	Administration	$1500(12)(12) = 216K$	$2500(12)(12) = 360K$
−	Commission	$(0.05)(3852K) = \$192.6K$	$(0.05)(8520K) = \$426K$
−	Risk charge	$(0.03)(3852K) = \$115.56K$	$(0.03)(8520K) = 255.60K$
−	Rate stabilization reserve	50,000	50,000
	REFUND	$291,160	$310,600

*Claims charged =

		Group 4	Group 5
	Total claims	2,831,000	6,265,000
−	Pooled claims	311,000	
+	Pooled charge**	$(29.26)(1500)(12) = 526,680$	$(20.26)(2500)(12) = 877,800$
	Claims charged	3,046,680	7,142,800

$$**\text{Pooled charged PMPM} = \frac{\text{Pooled PMPM}}{\text{Trend}} = \frac{\$35}{(1.012)^6(1.009)^{12}} = \$29.26$$

Total annual cost = $PMPM \times 12 \times$ number of members.

(b) Steps: Calculate manual rate.
Calculate experience rate.
Blend together.
Calculate required revenue.
Calculate tiered rates.

- Manual Rate Calculation:

-- Rate per employee $= \dfrac{PEPM \times \text{weighted relativity}}{\text{Adjustment}}$

$$\begin{aligned} PEPM &= 263 - \text{weighted relativity} \\ &= (\%\ \text{ee's} \times 1.0) + (\&\ \text{ee's/Fam} \times 2.5) \\ &= (0.3)(1.0) + (0.7)(2.5) \\ &= 2.05 \end{aligned}$$

Adjustment = 1.75

$$\text{Rate per employee} = \frac{(263)(2.05)}{1.75} = \$308.09$$

Adjust for:

A/S	1.05
Benefit	0.75
Region	1.00
Trend	$(1+0.012)^2$
Adjusted manual rate =	248.48

- Experience Rate Calculation:

$$\text{Net Claims } PEPM = \frac{\overbrace{3900}^{PEPM} - \dfrac{\overbrace{540{,}000}^{\text{Pooled claims}}}{\underbrace{900}_{\#\text{ of employees}}}}{12} = \$275$$

Trend from 1/00 to 7/02	$=(1.009)^{12}(1.012)^8 = 1.225$
Trend claims	= 336.88
+ Pool charge	= 35.00
PEPM	= 371.88

- Weight Together:

  Credibility $= 75\%$

  Weighted *PEPM* $= (0.75)(\text{Experience rate}) + (0.25)(\text{Manual})$
  $= (0.75)(371.88) + (0.25)(248.48)$
  $= 341.03$

- Required Revenue (Gross Premium):

$$\text{Gross Premium} = \frac{\text{Net Premium} + \text{Admin.}}{(1 - \text{Commission} - \text{Profit})}$$
$$= \frac{341.03 + 12}{(1 - 0.05 - 0.03)}$$
$$= \$383.73$$

- Tiered Rate Calculation:

$$\text{EE Rate} = \frac{\text{Gross Premium}}{\text{Weighted Premium}}$$
$$= \frac{383.73}{2.05}$$
$$= \$187.18$$

$$\text{EE / Fam. Rate} = (\text{EE Rate}) \times (\text{Tier Factor})$$
$$= 187.18 \times 2.5$$
$$= \$467.96$$

(c) Considerations:

- Trend (utilization + cost): Need to project from midpoint to midpoint.
- One-time events and/or shock claims.
- Mix of business (historical vs. projected).
- Match claims with exposure.
- Other factors:
  - Demographics (A/S, industry)
  - Policy Δ's.
  - Benefit Δ's.
  - Δ's in administrative procedures (e.g., governmental requirements, delivery system, competition).

Solution 9

(a) Recent Managed Care trends affecting all employers

(1) Industry restructuring and consolidation

- Fewer small MCOs and carriers reduce employer leverage
- Restructuring of physicians into single or multi-specialty groups
- Consolidation makes it harder to differentiate networks and select best for employer

(2) Healthcare company competition

- More healthcare providers/carriers have converted to "for profit" status
- Shareholders focused on earnings
- This competition has driven the industry to look for quick fixes rather than long term solutions

(3) Cost increases

- Despite utilization controls and managed care, costs continue to increase especially for prescriptions, mental health and others
- Aging population increasing costs
- Provider organizations resisting managed care discounts
- This combined with decreased capital to fund care makes decisions tougher

(4) Consumerism

- Part empowerment and part managed care backlash
- Employees more aware of benefits and demand care that meets their access and convenience needs
- Employees have diverse needs
- Internet – helping to fuel consumerism with information

(5) Quality Initiatives

- Has become more than just "talk"
- Now defining and measuring quality in response to consumer demand for quality
- Better data facilitating measurement and improvement
- NCQA accreditation

(b) Recent factors specific to group size:

(1) Large/jumbo (5000+)

- More resources
- Concerned with flexibility and national network quality
- Leverage in rate negotiations reduced with consolidation of large health plans
- Concerned with reporting if self-funded
- Usually represented by HR or benefits consultant
- Access important too
- Price used to be less significant but is becoming an issue

(2) Large groups (500-5000)

- Less concerned with national network
- Uses brokers and consultants
- Still concerned with quality
- Little self-funding so less concerned with reporting except related to experience rating
- Access and flexibility important
- Price increasing in importance

(3) Small groups

- Usually sold through broker/agent
- Cannot afford to hire benefits specialist
- Usually sole carrier, one plan of benefits situation
- Flexibility and reporting not important
- Main focus is price but also has paternal feelings toward quality

Solution 10

(a) Retiree COB:

1. Standard COB:
   Pay the lesser of charges (Medicare or charges × %. Entire cost is often covered.

2. Exclusion:
   $(C - M) \times \%$
   Exclude Medicare payment before calculating amount payable.

3. Carve out:
   $(C \times \%) - M$
   Lowest payment method.

4. Medicare Supplement:
   Separate plans to wrap around Medicare benefit.

5. Variations:
   Payments vary by order of claims submitted. Not in this situation.

(b) Medicare plan is primary:

Jill's Claims:

Cost = Utilization × (cost per script – co-payment)

Acme Current:

Generic cost =	5 *PMPM* × (20 – 10)	= 50 *PMPM*
Brand cost =	5 *PMPM* × (100 – 20)	= 400 *PMPM*
Total cost =		450 *PMPM* = *5400* PMPY

Total:

Generic =	5 × 20	= 100 *PMPM*
Brand =	5 × 100	= 500 *PMPM*
Total		= 600 *PMPM* = 7200 *PMPY*

Medicare:

Generic = 5 × 20 = 100 × 12 months =	1,200
Deductible =	– 50
Coinsurance @ 90% =	1,035
Brand = 5 ×100 = 500 × 12 months =	6,000
Deductible =	– 100
Coinsurance @ 80% =	4,720
Total Medicare = Generic + Brand =	5,755

Standard COB:
Lesser of total – Medicare or total × percentage covered.
Total – Medicare = 7200 – 5755 = 1445
Total covered = 5400

∴ ACME annual cost is $1,445. Jill has entire cost paid.

Carve Out:
(Total × %) – *M*

Total covered =	5,400
– Medicare	–5,755
	– 355

No payment made by ACME.

Exclusion COB:

		Generic				Brand		
Drug	Cost	Medicare	Jill	ACME	Cost	Medicare	Jill	ACME
1	20	0	10	10	100	0	20	80
2	20	0	10	10	100	80	20	0
3	20	9	10	1	100	80	20	0
4-60	20	18	2	0	100	80	20	0
				21				80

21 + 80 = $101 annually paid by ACME.

Solution 11

(a) Expense may be allocated by:

- Percentage of premiums
- Per policy
- Per benefit unit
- Per percentage of claims

The allocation may also be different between the first year and the renewal years.

(b) The following expenses are usually taken into account:

- Acquisition expenses: Often expressed on a per-policy basis.
- Commissions: Usually higher in first year.
- Agency expenses: Expressed as percentage of premium.
- Claim administration expenses: Usually on a per-claim or percentage-of-claims basis.
- Policy administration expenses: Most likely to be per-policy (or per-unit).
- Premium tax and other state taxes: Usually as a percent of premium
- Company overhead: Often as a percent of premium.
- Federal income tax: Usually as a percent of premium.

(c)

- The overall expense level expected to be incurred by the block of policies will be equal to aggregate expense charges expe3cted to be collected by the company for these policies.
- The formula expresses a reasonable and rational allocation of the expenses by rating cell within the block of policies.
- No competitive problems are created due to the resulting slope of premiums.

Solution 12

Life Insurance

Employees' Perspective

Life Insurance Premium

United States

Section 79 provides that employer provided contributions attributable to amounts in excess of $50,000 are taxable income to employee

Canada

Employer provided contributions for employee are taxable income to employees Amount of provincial sales taxes on premiums is also taxable.

Life Insurance Benefits

Benefits are not taxable in US and Canada

First $10,000 of Death benefits paid directly by employer in Canada are tax free

Employers' Perspective

Life Insurance Premium

Employer provided premium are tax deductible as a business expense in US and Canada

Disability

Employees' Prospective

Disability Premium

Employee may not deduct any premiums paid with after tax income

Employer provided contributions for employee are not taxable income to employee in US and Canada

Disability Benefits

United States

When an employee contributes a portion of premium, the respective portion of the benefits would be tax-free.

Canada

All benefits paid for by the employer are taxable to the employee.

When plan is fully paid for by employee, benefits paid are not taxable

Employers' Perspective

Disability Premium

Employer provided contributions are deductible as a business expense in the US and Canada

Medical

Employees' Prospective

Medical Contributions/Premiums

United States:

Employees may deduct premiums they paid with after-tax dollars on the individual federal income tax returns - subject to the 7.5% of Adjusted Gross Income limitation.

Employer provided contributions are not taxable income to employee

Canada

Employer provided contributions are not taxable income to employee

Medical Benefits

Benefits are tax-exempt in US and Canada

Employers' Prospective

Medical Contributions

Employer provided contributions are deductible as a business expense in the US and Canada

Employer provided contributions for domestic partners are not deductible

Long Term Care Insurance

Employees' Prospective

Long Term Care Insurance Premium

United States

Plan must be qualified to be considered for tax treatment

Employee may deduct any premiums paid with after tax income

Canada

Employer provided contributions for employee are not taxable income to employees

Long Term Care Insurance Benefits

Benefits are tax-exempt in US and Canada

Employers' Prospective

Long Term Care Insurance Premium

Employer provided premium are deductible as a business expense in US and Canada

Solution 13

(a) Renewal guarantees

1. Optionally renewable
   - Weakest form
   - Can be cancel by insurer
   - Can change premium rate

2. Conditionally renewable
   - No action on single individuals is allowed
   - Change in rate/cancellation must apply to entire calls or policies sold in state (same class)
   - May require approval by regulators

3. Guaranteed renewable
   - Cannot cancel
   - Can change rate for whole class risks and for all class risks in that state
   - May require approval from regulator

4. Non-cancellable
   - Strongest form
   - No rate change or cancellation allowed

(b) Factors influencing lapsation

Lapsation varies by:

1. Duration – decreases as duration increases
2. Age – increases as age decreases generally
3. Mode of premium payment – annual has lower lapse rates than monthly
4. Premium level and rate increases – lower lapse rates for lower levels of premium and for level rates (no increases)
5. Types of products – higher lapse rates for medical than for life
6. Occupation – wealthier occupations and those with more stability lapse less

(c) Differences between individual life insurance underwriting and major medical underwriting

1 Medical claim has high frequency low amount
   - Life claim can only die once
   - Assess expected claim amount rather than an earlier than usual claim
2. Medical claim more predictable for insured, subject to anti-selection
   - Surgical procedures desired but not life-threatening.
3. Medical claim costs unknown in advance
4. Duration of disability varies.
5. Medical claim reimbursement paid to insured self, not beneficiary.
6. Medical treatment more elective.
7. Experience data less due to:
   - Variations by product and small volume
   - Different practice in different area
   - Technology.

(d) Sources of information an underwriter can use:

1. Application and other supplemental questionnaires, medical info provided by the applicant
2. Medical examination: may request a more current medical exam.
3. Medical impairment bureau – collection of data from many health carriers.
4 Financial questionnaires – what sources of income but this is medical not disability.
5. Attending physician's statement – medical records from physician seen recently.
6. Doctor at company/medical director – help underwrite difficult cases.
7. Inspection report – general reputation, moral hazards, driving record, finances.
8. Agent – underwrite the agent as well as agent being a source of info about client.

Solution 14

(a) **Challenges**

- **Consistency:**
  Numerical reports should consistently include or exclude data. Consistency of information is important. To ascertain the extent of it one may need to educate the audience on differences from other reports if inconsistent. For example, use consistent paid dates, either when the check is issued or when check clears. In addition, if you are using restated reserves, consider the impact on the results. Another reason for consistency is that results may be reported differently by company. As a result, you need to put all reporting on a single basis whenever possible.

- **Availability of Data:**
  Consider the source of data being reported. Is the data to be retrieved available only on a manual basis? Are there similar reports?

- **Reliability of Data:**
  Check the validity of the data unless the data is self-correcting. Compare multiple sources of the same data. Check the data by incorporating edits. Ascertain the accuracy of systems as they may change over time. Verify that certain values are within reasonable ranges of each other.

- **Value of the Data:**
  Ask what actions could be taken from a given report. Retire reports that are not providing useful information or providing action items. In addition, consider the cost of producing the report.

- **Extracting Information from the Data:**
  Consider the best way to present data to provide the most information (i.e. text, numbers, or graphics) Consider the amount of time available to analyze reports in determining the best format for the intended audience. Be concise.

(b) **Information/Reports to Analyze Expenses**

Report expenses from a total company perspective. Break down the cost of operations by chief components such as Commissions and Overrides, General Expenses including Salaries and Benefits, Computer Operations, Service Fees, Provider Benefits, Corporate Overhead, and all other expenses such as premium taxes, licenses, and fees for each line of business.

A check on expense levels would be to present them as a percent of earned premium and equivalents. Split expenses into people related, corporate overhead, computer systems, external fees to vendors and provider networks. Distribute global expenses into functional activity centers. Expense monitoring can be developed from budget reports. Use the current budget, the prior budget, prior actual expenses, variance amount and

percentages, and the remaining estimates. Split reports by organizational area to monitor and control cost by area. Roll up by department, division, and entire the company. Develop work effort budgets. Total expenses should correspond to anticipated future work effort to project and monitor unit costs. Develop unit cost reports, as expenses need to be shown in terms of the results produced and the work effort extended.

Information/Reports to Analyze Claims

Consider the financial results. Look at ratios of incurred claims to earned premiums as well as expenses to earned premiums or fee income to claim equivalents. Develop PMPMs for managed care. Mortality studies would include various factors such as type of schedule, age, sex, type of underwriting, and lifestyle status. Disability studies would include various factors such as frequency, initial severity and recovery rates. Divide recovery statistics into various classes such as mental illness and AIDS.

Develop Claim Lag Studies. (Dates would include date paid as well as date incurred.)

Report to policyholders would include reports on charge amounts and reasons for not paying all charges. Breakdown submitted charges into sources. Compare time periods and sub-groups against normative data. Develop utilization and average charge per service per member reports. Develop bank reconciliation reports. Develop large claim reports as well as claim payment detail reports and claim lag reports.

Monitor providers and networks. Measurements include number of office visits, specialist referral, high frequency/high dollar services, inpatient/out patient utilization per member per month and frequently used laboratory tests.

HEDIS

Industry standard for managed care reporting for Medicaid, Medicare and commercial populations. Reporting covers effectiveness of care, access/availability of care, satisfaction with care, health plan stability, use of services, costs of care, informed health care choices, and health plan descriptive information.

Solution 15

(a)

Manual rating

- Base rates are based on claim cost developed by age/gender
- Sum up all individual cost to get the group base cost
- Manual premium = sum of manual claim cost + retention
- Manual premium adjusted by group and demo graphic

Data Source (of manual rates)

- Own data, only large company is able to develop
- Industry data – SOA studies
- Government & Population Data

Need to adjust data for the following

- Change in mortality
  - 1-2 % improvement per year
- Benefit level: high face amount leads to better mortality
- Level of individual underwriting
- Difference in disability provision
- Industry
- Contrib Level: higher employer contrib. Percentage leads to lower anti-selection
- Effective date: affect age calculation

(b)

- May expand individual underwriting
- Blend past experience of group with manual rates
- Require higher contribution from employers. Leads to higher participation and reduce antiselection
- Less spread of benefits and options.
  - Example: offer a core of 1x salary, with an option of 2x salary]
  - Consider flat benefit amount (rather than a multiple of salary)
- Industry: vary rates by industry; reject some with high mortality rates
- Exclusions for war, suicide, higher risk occupations

(c) Qverall Actual to Expected Mortality ratio

$$= \text{sum of } (A/E) \text{ by age/gender, weighted by volume}$$

$$= \frac{\left(\frac{0.148}{0.16} \times 24880 + \frac{0.11}{0.124} \times 1847300 + \ldots + \frac{0.0479}{0.499} \times 127900\right)}{(248800 + 1847300 + \ldots 127900)}$$

$$= \frac{59,217,686}{64,033,200}$$

$$= 0.925$$

This implies that the actual mortality rate runs 7.5% better than expected.

Solution 16

(a)

1. Evaluate Actual vs. Expected Incidence Rate

Actual number of claims for the year 2000:
$= 748 + 853 + 841 + 916 = 3{,}358$

Actual lives exposure:

$$= \frac{(695{,}364 + 721{,}440 + 748{,}494 + 776{,}563)}{4} = 735{,}465$$

So actual incidence rate $= \frac{3358}{735{,}465} \times 1000 = 4.57$ (per 1000)

A/E Incidence $\frac{4.566}{3.50} = 1.30$

So the actual experience requires 30% rate increase.

To keep the account, need to change the benefit plan so that the claim cost is reduced at least to 105% of expected level.

2. Consider changing EP from 90 day to 180 day:

90-Day EP Claim Cost = Incidence Rate × Reserves

Incidence Rate $= \frac{2.34}{1000}$

Reserves $= \sum_t B \times v^t \times c^t$

Where: $t = 1$ to 5
B = benefit amount
$v^t = 1$ for $i = 0$,
c^t = continuance rate $= \sum_t c^t$

Assume all terminations occur at end of the period,

	Term Rate	$PV^t = c^t$
Year 1	0.5	1.000
Year 2	$1.2 \times 0.22 = 0.264$	0.500
Year 3	$1.2 \times 0.14 = 0.168$	0.368
Year 4	$1.2 \times 0.06 = 0.072$	0.306
Year 5	1.00	0.284

So reserve = sum of present values = 2.458

90-day EP Claim Cost:

$$CC = \frac{2.34}{1000} \times 2.458 = \frac{5.75}{\$1000}$$

Base Rate: $BR90 = \dfrac{CC}{(1 - \text{Retention})} = \dfrac{5.75}{0.75} = \dfrac{7.67}{1000}$

Similarly, for 180 EP plan;

	Term Rate	$PV^t = c^t$
Year 1	0.21	1.000
Year 2	0.22	0.790
Year 3	0.14	0.616
Year 4	0.06	0.530
Year 5	1.00	0.498

Reserve is the sum of the present values, equal to $\dfrac{3.434}{1000}$

180-day *EP* Claim Cost: $CC = \dfrac{1.37}{1000} \times 3.434 = \dfrac{4.70}{1000}$.

Base Rate: $BR180 = \dfrac{CC}{0.75} = \dfrac{6.27}{1000}$.

The cost reduction is $(1 - BR180/BR90) = 18\%$. Therefore, changing *EP* from 90 to 180 days will not make the 105% of current rate sufficient.

Solution 17

(a) Benefits that could be offered:

- High benefits percentage: 70%
- High monthly maximum benefit: $20,000
- Own occupation definition of disability or specialty own occupation
- Automatic increases with inflation without evidence of insurance
- COLA rider with fixed percentage increases
- Residual benefits
- Treat disabilities from alcohol and drug addiction the same as other illnesses
- Treat disabilities from mental health disorders the same as other illnesses
- Zero day residual – no requirement to be totally disabled throughout elimination period.
- Liberalize the definition of earnings
- Do not offset with social security.

(b) Recommendations:

- Limit maximum benefit to $10,000 - $15,000 – comfortable not lavish
- Limit benefit period for disabilities for mental health, or drug/alcohol addiction when permitted by law.
- Restricted availability of own or specialty occupation definition of disability
- COLA riders should not exceed CPI to maintain incentive for recovery.
- Keep replacement ratios below 100% to make sure there is no financial incentive to go on disability.
- Offer residual benefits but limit period (24 months).
- Do not use liberal definition of prior monthly earnings.
- Offer non-cancelable policies – but may need to reinsure.
- Limit automatic indexing of benefits by requiring evidence of insurance.
- Offer zero-day residual but ensure that pricing incidence rates reflect this benefit.

Solution 18

(a) Design Approaches

- Reduce spread across benefit levels, i.e. limit differential between richest and cheapest options
- Bundle coverages together
  - Could bundle a dental benefit with medical election in an effort to increase participation and help spread the risk
- Limit employee choices
- Parallel coverages; bundle the dental benefit with medical and make all the dental components the same
- Limit employee movements between options
  - Only allow the employee to elect up or down to the next richest benefit
  - If they can't go from the cheapest to the richest benefit in one year, this will help limit selection
- Limit enrollment periods
  - Once a plan has been selected or someone has chosen to opt-out, require them to keep this coverage for 2 years
- Limit the benefits available under the plan for the first 6 months or 1 year
  - For example, no coverage of Type II or III dental benefits until you have been enrolled in that option for a specified time period

(b) Advantages and Disadvantages

- A single rate is administratively easier to handle than an age-banded structure
  - It avoids any age/gender discrimination problems and is easy to communicate
  - It also encourages adverse selection since the younger/healthier lives can get a better deal elsewhere
  - Usually the older, higher risk participants will take the coverage since it is cheaper than available elsewhere.

(c) Dental Pricing:

- One option is to price options only based on actuarial/benefit values and ignore selection.
  - Increase all actuarial values by 5%.
  - i.e.,High: $1000 \times 1.05 = 1051$
    Intermediate: $800 \times 1.05 = 840$
    Low: $500 \times 1.05 = 525$

- Another option is to spread the selection equally across all options, keeping the same relative values as under actuarial value.
  - Total cost = $\$1575\times100+\$924\times250+\$315\times150=\$435,750$.
  - High: $\dfrac{\$435,750}{\left(100\times1+250\times\left(\dfrac{\$840}{\$1050}\right)+150\times\left(\dfrac{\$525}{\$1050}\right)\right)}=\$1,162$.
  - Intermediate: $\$1,162\times\left(\dfrac{\$840}{\$1050}\right)=\$930$.
  - Low: $\$1,162\times\left(\dfrac{\$525}{\$1050}\right)=\$581$.

- A third option is to assign selection to options generating the selections.
  - High: $\dfrac{\$150,000}{100}\times1.05=\$1,575$.
  - Intermediate: $\dfrac{\$220,000}{250}\times1.05=\$924$.
  - Low: $\dfrac{\$45,000}{150}\times1.05=\$315$.

(d) Employee survey:
- Look at continuance tables of participants.
- Analyze total cost (contribution and out-of-pocket expense) to each participant under each option to see how each would maximize value.

Solution 19

(a) Benefit Features:

- Generally, coverages are very similar.
- Typically include:
  - Nursing home
  - Home health care
  - Adult day care.
- Group tends to have some customization by employer.
- Issue age for group generally much lower.

Underwriting:

- Group often guaranteed issue.
  - Feature is unique to group (not available in individual).
  - May require minimum participation.
- Most group plans use simplified underwriting.
- GLTC will use simplified underwriting if coverage provided for spouse, parents, retirees.
- Individual includes health and lifestyle underwriting.
  - Health underwriting includes short form, perhaps medical exam and APS for individuals over age 65.
  - Lifestyle underwriting is used to determine functional status of the individual and can often be conducted over the phone.

(b) Activities of Daily Living (ADL):

- Include bathing, dressing, toileting, transfer, continence, feeding.
- May require some combination of ADLs to be eligible.
- Generally, 2-3 ADLs.
- Varies by insurer.

IADLs:

- Instrumental activities of daily living, including managing finances, shopping, chores.
- More complex ADLs.

Cognitive Impairments:

- Presence of specific behaviors such as getting lost or combativeness.

Definition of Impairment:

- Important in determining insured event.
- Include "has difficulty with," "needs assistance," or cannot do."

(c)

- GLTC conversion upon employee termination or upon cancellation of group policy.
- Convertible to individual policy.
- Coverage generally the same.
- Premium continues to be based on age at issue.

Solution 20

(a) Underwriting Guidelines:
Worksite marketing can be based on either individual or group underwriting methods.

Direct Marketing Relies on Products:

- Which do not require a great deal of underwriting
- Where any potential anti-selection can be accommodated in the product design or the premium rate structure.

The degree of underwriting can be varied depending on the expected participation within the group, i.e.:

- When full participation is expected, very little underwriting is required.
- As the participation falls, the degree of underwriting increases.

Amount of Underwriting:

- More underwriting produces tradeoff of lower morbidity but also lower response and issue rate.
- On direct market, increased underwriting means lower response rate.
  - Underwriting can be tailored to the specific situation.
  - Underwriting can vary depending on the expected response rates.

Underwriting is limited, usually non-medical or even guaranteed issue or guaranteed to issue:

- Quickest issue process
- Guaranteed-to-issue program, minimum level of coverage offered to all, but higher benefit amounts on life or critical illness may require more underwriting.
- Must rely on accurate morbidity of underlying population and the actively-at-work requirement.
- May be a significant amount of anti-selection.

Simple/Minimal Underwriting:

- Simple accept/reject application with just a few pertinent questions.
- Focus on medical questions with regard to heart, lung, or HIV.
- Since average premium rates for these products are generally low, must have low allowance for expense.
- Exclusions can be used on some products rather than decline, based on response to questions.
- Can't afford to do a lot, because of low premium.

Other Alternatives:

- Pre-existing conditions limitation depending on company practices, coverage provided, and amount of underwriting.
- Waiting periods that provide very effective protection against anti-selection.
- Exclusions for listed conditions.

Steps in Designing Underwriting Guidelines:

- Determine the risk profile of the population in the market.
  - Characteristics of the target market
  - How the marketing method will approach persons.
- Determine questions that will be asked on forms based on:
  - Marketing approach
  - Competitor practices.
- Decide what actions the company will take for different responses to the underwriting questions.
  - Any different treatment based on information in responses vs. just accept/reject?

Marketing Approaches

Possible Methods:

- Mail-based (direct mail, billing inserts)
- Mass media advertising (television, radio)
- Telephone solicitation

Movement towards more customer-based versus product-based:

- Products are chosen to be suitable for the customers.
- Important to gather personal information about the group (demographic, economic and geographic)

Means to obtain the personal information:

- The association involved is a valuable source.
- Any applicable cross-selling opportunities by utilizing policyholders files.

Factors considered in selecting approach:

- Target population
- Group affinity
- Products offered
- Underwriting methods used.

(c) **Appropriate Products/Features**

Cancer

- Types include uncapped, indemnity, hybrid, first occurrence.
- Core benefits are inpatient care, chemo, and radiation.
- Ancillary benefits like outpatient physician or surgery.
- Recommend indemnity-style plan for this initiative; less uncertainty regarding impact of treatment changes or medical trend.
- Less margin for uncertainty helps produce lower price point for direct marketing.
- Less underwriting required.
- First occurrence would probably be OK too.

Hospital Indemnity Plan (HIP)

- Pays set amount for each day in hospital.
- May provide some ancillary benefits.
- Usually a hospital benefit period cap, six months to one year.
- Good candidate for this initiative (indemnity fits well, low cost, very limited underwriting).

Supplemental Disability

- Usually indemnity, could be a percentage of salary.
- Limited benefit period, e.g., two years.
- Pre-existing limitation.
- Limited underwriting.
- Reasonable candidate for this initiative (low cost, limited underwriting, indemnity is good fit).
- Emphasis on:
  - Benefit simplicity
  - Ease of policy issue.
- Degree of underwriting or the level of benefits available may vary based on participation.
- Some level of guaranteed issue benefits may be available.
- Individual-type underwriting for benefit amounts greater than the guaranteed coverage.
- Actively-at-work requirement.

Critical Illness

- List of key illnesses
- May pay lump sum on diagnosis or expenses
- Very new product, evolving
- Requires more underwriting than many supplemental products
- Underwriting may resemble individual life insurance on higher benefit amounts
- Do NOT recommend this product for initiative (too expensive, too much underwriting required, too much uncertainty because it is a new product).

- Do NOT recommend this product for initiative (too expensive, too much underwriting required, too much uncertainty because it is a new product)

Solution 21

Possible sources of difference:

Data sources:

- Using the company's own experience. Different claims experience will drive different rates.
- Could have different demographics among the groups.
- Could be using other data sources:
  - Other companies experience
  - HIAA data
  - Purchased rate manuals.

Adverse selection:

- Plan H has Rx benefits that may drive adverse selection

Impact of provider contracts:

- Medicare Select
- Benefits only available at specific providers.
- Different discounts depending on the network.

Assumptions:

- Expenses
- Commissions
- Profit
- Trend
- Lapse rates.

Benefits covered:

- Benefits are different for Plan B vs. Plan H.

Solution 22

(a) Medical and Dental:

- Pricing schemes:
  - Carve out
    - Subtract core coverage
    - Have opt up/down
    - Disadvantages:
      - Doesn't reflect true costs
      - Is $0 benefit always free?
      - Increases in future.
  - Subsidized pricing:
    - Can encourage selection of a particular option.
    - Difficult to determine pricing in future years.
    - Should subsidy be removed in future?

Life and LTD;

- Could reflect age and sex
- Core benefit to make clear that it is employer-paid

(b) Advantages:

- Employees can purchase extra vacation days.
  - Short-service employees who would like more days
  - Long-service employees who would like to take a longer vacation occasionally.
- Employees can sell days.
  - Generate credits to use for other benefits
- Accommodate time off to care for family members, sick children, etc.
- Transition from benefit banking.

Design Considerations:

- Can include personal days, vacations days, holidays.
- Scheduling problems with purchasing vacation days.
- Limit number of days can buy or sell.
- Selling days converts into hard dollar costs.
- Limit dollar amount for a vacation day.
- Purchased days need to be cased out at the end of the year if not used.
  - Otherwise viewed as deferred compensation.
- Good time-off reporting mechanism is needed, otherwise potential for abuse.
- Selling days and using credits for other benefits considered taxable in Canada.