Solution 1

(a)

- Business objectives of the company
  - Expected rate of growth for the business to be reinsured
- Ceding company management
  - Experience
  - Comfort level with risk retention
- Reinsurance program objectives
  - Does it fit with reinsurer's strategy
- Financial condition of the ceding company
  - Capitalization levels
  - Ratings
- Administration
  - Capabilities
- Underwriting
  - Company's loss experience with product to be reinsured
- Claims adjudication
  - Claims payment philosophy
- Marketing and sales
  - Sophistication with product to be reinsured
- Expected reinsurer's profit
  - Adequate premium levels

(b)

- Rating practices
  - Review periodically
  - Use prospective rates
- Operational expertise
  - Underwriting
  - Claims adjudication
- Client mix
  - Larger client base will achieve a better spread of risk
- Credible size in block of business
  - Only quote business that fit with overall niche marketing strategy
- Consistency in risk management techniques
  - Ability to manage market cycles

Solution 2

(a)

- Multi-plan options
  - Employer sets the menu
  - Employee may have the additional option of placing pre-tax money in an FSA account
- Supermarket concept plus health account
  - Supermarket offers multiple health plan choices
  - Employer provides core contribution and access to supermarket
- High-deductible plan with health account
  - May also have a PHA(employer funded)
  - Employee decides whether or not to spend PHA funds
- PHA plus FSA
  - Employer provides only a core contribution to a PHA
  - Employee may deposit money in FSA
  - Employee may use the money to buy insurance or pay health care goods and services

(b)

(i) Consumer's stake in spending decision increases in the following order:

- Multi-plan options (with optional FSA)
  - Consumer chooses plan based on preferences and cost
  - Money is optional FSA is consumer's own but "use it or lose it" rule creates distortion to that
- Supermarket concept plus health account
  - Coordinating plans and account increases stake
- High-deductible plan with health account
  - Choice of high-deductible plans increases consumer's consideration of cost
- PHA plus FSA
  - Highest stake

(ii) Flexibility of funding options for consumer increases in the following order:

- Multi-plan options (with optional FSA)
  - Consumer may choose richer plan to reduce 'out of pocket' cost
- Supermarket concept plus health account
  - Ability to pool employer contributions toward supermarket if spouse's contributes to the same supermarket

Solution 2 (continued)

- High-deductible plan with health account
  - Increased ability to decide between spending and saving PHA money
- PHA plus FSA
  - Highest flexibility

(iii) Employer administration stewardship increases in the following order:

- Multi-plan options (with optional FSA)
  - Employer must administer the plan and design all options
  - Some admin associated with the account
- High-deductible plan with health account
  - Employer may control menu of plan designs by selecting the 'high deductible+account' approach
- Supermarket concept plus health account
  - Employer chooses supermarket
  - Supermarket does most of the work
- PHA plus FSA
  - Lowest
  - Least control over use of contributions

(c)

- Repeal the 'use it or lose it rules' for FSA
  - Allow account balance to roll over for later uses
- Allow FSA to pay for premiums
- Clarify the flexibility of fund uses for PHA
- Clarify the rollover treatment for FSA
- Allow tax-efficient portability of PHA
  - Opportunity for employees to carry balance when employment is terminated or at retirement
  - COBRA

Solution 3

(a) Macro-economic variables

- Increases in wealth-increases demand for healthcare
- Increases in physician supply-increases access and availability of healthcare
- Cost shifting-from government programs (Medicare & Medicaid) to commercial business to make up for lower government reimbursements
- Increases the number of specialists-more intensive and expensive procedures
- Benefit plans-richer plans increase spending
- Price inflation-positive correlation to cost trends
- Managed care techniques-how much of an effect can it have on cost trends

Micro-economic

- Population health
- Availability of insurance
- Inflation
- Demographics

(b) Residual Trend

- Random Fluctuations
- Cost shifting from one segment to another ex: Medicare decreases payments
- Expansion of covered services due to legislation
- Increase in provider reimbursement due to change in billing (code creep)
- Demographic characteristics-ex: shift to more expensive area
- Utilization trend-change in frequency
- Advance in technology-more expensive treatments
- Level (or Intensity) of Medical Services – ex: shift from outpatient to inpatient
- Product Mix Changes-changes in plan designs

Provider Reimbursement Trend-trend in provider cost

Solution 3 (continued)

(c) Relationship of historical trends and rating trend assumptions

- past historical trend is not the same as the trend for rating
- rating trend is different from prior trend (which is driven by claim trend) due to:
  - underwriting judgment
  - experience rating
  - regulation

Need to analyze the historical trend and the driving factors

To analyze the driving factors:

- historical change in experience
- identify abnormality in historical trend
- Changes from historical experience:
  - Large claim pattern
  - Intervention
  - Apply managed care program
  - change in provider contract
  - change in underwriting practice
  - change in claim administration
  - enrollment shift
  - plan (benefit) change

- Secular change
  - recession
  - inflation
  - government change

- Overlap in estimate historic change

- Analysis of large claims

Solution 3 (continued)

(d)

	7/02-6/03	7/01-6/02
Total Claims	6,258,000	4,967,000
Total Exposures	3000×12 =36,000	2,800×12 =33,600
PMPM	173.83	147.83 ← +17.6%
→ Age/gender factor	1	0.979 ← +2.1%
→ Region	1	1
→ Benefit Factor	0.74	0.736 ← +0.4%
Normalized PMPM	234.9	205.16 ← +14.5%
Large claims > 50,000	922,000	665,000
Large Claim PMPM	25.61	19.80 ← +29.3%
Normalized PMPM	34.61	27.48 ← +25.9%

Other components want to look at

- utilization of service per member (frequency)
- size of claim, cost per unit of service (severity)
- by service categories
- provider reimbursement trend by service categories

Solution 4

(a) indemnity

- scheduled reimbursement
  - maximum amount specified for a given procedure
- non-scheduled reimbursement
  - usual, customary, reasonable (UCR)

usual- amount usually charged for procedure
customary-average procedure reimbursement for a given region
reasonable-reasonable charge in unusual circumstances

DHMO

- IPA DHMO
  - capitation used for reimbursement
- staff model DHMO
  - HMO hires its own dentists

Preferred provider organization

- Discount off billed services
  - Dentists agree to a specified discount off what they would normally bill

Managed indemnity

- Reimburse maximum amount for services

Fee schedule

- Dentists agree to a list of fees which is comprised of average discounted charges for a given region

Discount cards

- Offered by employers who don't have dental program
- Employees have to pay entire amount, but get a discount

Exclusive provider organizations (EPO's)

- Cover in-network services only

POS (point-of-service)

- Three-tiered benefit (HMO, In-network PPO, out-of-network PPO)

Solution 4 (continued)

(b)

	HMO	PPO	Indemnity
premium	low	medium	high
patient access	low	medium	high
benefit richness	high	medium	low
cost management	high	medium	low
utilization	low	medium	high
quality assurance	high	medium	medium
fraud potential	low	medium	high

(c) limit complexity

* indemnity is favored

- employee doesn't have to worry about networks
- no fee schedules or agreements for capitation with dentists
- plan design is simple since benefit is the same for all dentists
- reimbursements are also the same

avoid adverse selection

* HMO is favored

- must pass through a gate-keeper
- best cost controlling features
- consider including a 12 month deferral on major services

avoid employee dissatisfaction due to providers

* indemnity is favored

- no networks
- employee can choose dentist
- case management is minimal

maintain current employer contributions

* PPO is favored

- packaged with medical
- most employee's have PPO medical coverage
- more employees will have a consistent contribution

Recommendation

* PPO

- since the Indemnity and HMO benefits were favorable in achieving certain goals, a blend between the two would best balance these achievements.

Solution 5

(a)

Given:
6/30/03 Balance = 60,000

Monthly Premium at 2003 rate = 1,000 x 143 + 500 x 358 = 322,000
Estimated Premium for 7/1/03 – 12/31/03 = 322,000 x 6 = $1,932,000

Estimated claims for 7/1/03 – 12/31/03
Experience Period 7/1/02 – 6/30/03 – Midpoint 1/1/03
Projection Period 7/1/03 – 12/31/03 – Midpoint 10/1/03

Trend = 1.009 ^9 = 1.084

Claims under 50,000 = 2,831,000 – 311,000 = 2,520,000
Projected claims for 7/03 – 12/03 = 2,520,000 x 1.084 / 2= $1,365,840

Other items – Question indicates that pricing factors have not changed
Pooling Charge = $35 x 1,500 x 6 = $315,000
Admin expense = $12 x 1,500 x 6 = $108,000
Commissions = 5% x $1,932,000 = $96,600
Risk/Profit = 3% x $1,932,000 = $57,960

12/31/03 Balance = 6/30/03 Balance + Premiums – Projected Claims – Pooling Charges–Admin Expense – Commissions – Risk/Profit

Balance = $60,000 + $1,932,000 - $1,365,840 - $315,000 - $108,000 - $96,600 - $57,960 = $48,600

(b) Since there are 1,500 employees, the group is 100% credible

Experience Period 7/1/02 – 1/1/03 – Midpoint 1/1/03
Projection Period 1/1/04 – 12/31/04 – Midpoint 7/1/04

Trend
12 months of 2003 and 6 months of 2004
Trend = 1.009^12 x 1.012^6 = 1.196

Solution 5 (continued)

Claims under 50,000 = 2,831,000 – 311,000 = 2,520,000
Projected claims = $2,520,000 x 1.196 = 3,013,920
Pooling charge = $35 x 1,500 x 12 = $630,000
Admin expense = $12 x 1,500 x 12 = $216,000
Total Required Premium = ($3,013,920+630,000+216,000)/(1-5%-3%) = $4,195,565

$4,195,565 = (1,000 x EE only + 500 x EE only x 2.5) x 12

2004 renewal rates
Ee only = $155.39
Ee and Dependents = 155.39 x 2.5 = $388.48

(c) Prospective Experience Rating Pros
- Insurer bears risk of adverse experience

Prospective Experience Rating Cons
- Insurer gets benefit of favorable experience
- Pay premium tax
- Mandated benefits must be covered

Retrospective Experience Rating Pros
- Employer gets benefit of favorable experience

Retrospective Experience Rating Cons
- Employer is accountable for bad experience
- Pay premium tax
- Mandated benefits must be covered

Self-funding Pros
- Benefit of good experience
- Premium tax is avoided
- Avoid state mandates
- Better cash flow
- No (or reduced) risk charges

Self-funding Cons
- Employer has risk of adverse experience
  - can purchase specific and/or aggregate stoploss

Solution 5 (continued)

Minimum Premium Pros
- Insurer bears risk of adverse experience
- May have reduced premium taxes

Minimum Premium Cons
- Must include mandated coverage

Group 4 – Current Plan – Retrospective Premium Arrangement

Pros
- Future positive experience would be returned to group
- Insurer bears risk of adverse experience

Cons
- Would have received benefit of current formula balance if self-insured
- Plan is subject to state mandated benefits
- Premiums are subject to premium tax

Solution 6

(a)

	Paid Claims		
Jul-02	11,800	/ 44,500 =	26.5%
Aug-02	31,900	/ 44,500 =	71.7%
Sep-02	38,500	/ 44,500 =	86.5%
Oct-02	41,100	/ 44,500 =	92.4%
Nov-02	42,100	/ 44,500 =	94.6%
Dec-02	42,800	/ 44,500 =	96.2%
Dec-03	44,500		

	Paid Claims				Incurred Claims
Jul-03	49,300	/	96.2%	=	51,258
Aug-03	51,600	/	94.6%	=	54,542
Sep-03	49,800	/	92.4%	=	53,920
Oct-03	48,400	/	86.5%	=	55,943
Nov-03	44,100	/	71.7%	=	61,519
Dec-03	18,200	/	26.5%	=	68,636

(b)

				IBNR
51,258	-	49,300	=	1,958
54,542	-	51,600	=	2,942
53,920	-	49,800	=	4,120
55,943	-	48,400	=	7,543
61,519	-	44,100	=	17,419
68,636	-	18,200	=	50,436
345,817		261,400		84,417

(c)

Analyze historical payments by lag duration and smoothing them.
It is rarely satisfactory to use just one month's incurral pattern.
Can average completion factors or can average data then compute completion factors
Compute results using several averaging approaches and select the most likely pattern

Solution 6 (continued)

Ways to smooth:

Simple Averaging - 3, 6, 12 month averages of development factors
- 3 months most current
- 12 month smoother, but may bury current trends

Removing Bumps (Without Hi/Lo)
- 6 of last 8 or 8 of last 10
- cannot ignore large claim completely

Weighted Averaging
- sum of the digits
- squared sum of the digits
- constantly declining percentage

Other Types of means
- Harmonic Mean - compute mean of the reciprocals of each data point and then take reciprocal
- Geometric Mean - take the nth root of the product of n observations

Dollar Weighted

Per member - divide payments per lag by the related month's exposure
This adjusts for growing/declining volumes of business

Blending with Projection Methods - trended pmpm projections used for last few months of unstable completion estimates

Blending with the Loss Ratio Method - when membership is not available or for new line (Use pricing Loss Ratio)
divide completed incurred claim estimates by earned premium

Application of Credibility Weights -
blending depends on how reliable the development month's completion factors are

Consider Changes in Claim Inventory

Consider Changes in Claim Payment System

Solution 7

Note: The illustrative solution shown for part c relies on the CAST assumptions provided with this question. Students attempting to use the given classical pricing assumptions for part c would have found that the solution could not be fully completed using those assumptions. However, since the use of CAST assumptions was implied rather than specified, credit was given for setting up solutions which properly demonstrated the use of the appropriate formulas and methodology with the classical pricing assumptions.

(a)

CAST eliminates the concept of ultimate claims costs – claims costs increase by duration.
CAST classifies lives as impaired or healthy and the lapse rates of impaired lives are lower than the lapse rates of healthy lives.

The probability of an impaired life lapsing is:

$${}_iQ_t = K_1 \times ({}_aQ_t - u) + u$$

where u is the pure lapse rate.

(b)

Duration	Members	Tabular Claims Cost	Selection Adjustment	Adjusted Claims Cost	Total Claims
	1,000	10.0	0.05	0.50	500
1	800	11.0	1.1	12.1	9,680
2	640	12.0	1.1	13.2	8,448
3	512	13.0	1.1	14.3	7,322
4	410	14.0	1.1	15.4	6,308
Total	3,362				32,257

Claims cost per member per month = 32,257 / 3,362 = $9.60

Target loss ratio = 60%
Required Gross Premium = 9.60 / 6 = $15.99

Solution 7 (continued)

(c)

Formulas needed:

$L_x = {}_aL_x + {}_iL_x$
${}_iS_t = K_2 \times {}_aS_t$
$L_1 \times S_1 = {}_aL_1 \times {}_aS_1 + {}_iL_1 \times {}_iS_1$
${}_iQ_t = K_1 \times ({}_aQ_t - u) + u$
${}_iQ_t \times {}_iL_t + {}_aQ_t \times {}_aL_t = L_t - L_{t+1}$

actual claims per member year 0 = 6,000/1,000 = 6
tabular claims year 0 = 10
ratio of actual to tabular = 6 / 10 = .6
constant = $Q^{ai}_{,t} / {}_aS_t$ = .134 / 6.6 = .0203

t	L_t	${}_aL_t$	${}_iL_t$	Tab Claims	${}_aS_t$	Actual Claims	Proj. Claims	Actual $Q^{ai}_{,t}$	Proj. $Q^{ai}_{,t}$	${}_aQ^{(1)}_{,t}$	Cum. Claims
	1,000	1,000		10	6	6,000		.248		.23	6,000
1	770	522	248	11	6.6	10,000		.134		.182	16,000
2	650	357	293	12	7.2	11,000			.146	.338	27,000
3	500	184	316	13	7.8		11,294		.158	.643	38,294
4	350	37	313	14	8.4		10,828		.17		49,122
Tot	3,270	2,100	1,170								

Net Premium = 49,122 / 3,270 = 15.02
Target Loss Ratio = 60%
Gross Premium = 15.02 / 60% = $25.04

Solution 8

(a) Demographics
- Age
- Gender

Utilization Measures or Claim Expenditures
- Use only the impact of a person's health status on future expected costs

Diagnosis & Pharmacy Information

Medical information or history

Perceived health status
- Self-assessment of an individual's health status

Functional health status
- Able to perform basic activities of daily living

Lifestyle and behavior factors
- Smoking
- Diet

(b) Adjusted Clinical Groups
- Uses diagnosis data
- Uses both inpatient & ambulatory diagnosis codes
- Classifies individuals into 1 of 30 Adjusted Diagnosis Groups
- The groups are mutually exclusive

Chronic Illness & Disability Payment System
- Uses diagnosis data
- Used for Medicaid, can be used for commercial populations
- Assigns each person to one or more of 67 medical condition categories
- Individuals classified into age/gender categories

Clinical Risk Groups
- Looks at diagnosis and procedure codes

Diagnostic Cost Groups
- Uses diagnosis data
- Assigns each person to one or more medical condition categories
- Also assigned to an age/gender categories

Episode Risk Groups
- Groups medical services into episodes of care
- Uses a member's diagnosis codes and pharmacy data

Solution 8 (continued)

Medicaid Rx

Pharmacy-based risk assessment

Assigns members to medical condition categories and age/gender categories

RxGroups

Classifies individuals based on one or more drug therapy categories and age/gender categories

RxRisk

Pharmacy-based

(c) I would recommend using RxGroups.

- We want to evaluate Pharmacy usage – pharmacy data is available for both networks from the same PBM – so data should be consistent.
- All pharmacy encounters would be reflected.
- Categories are additive so it would reflect multiple drug therapies used.
- Population used to calibrate the models is more appropriate because Medicaid/Medicare data was not used.
- Using pharmacy data would be quicker and easier to use.

Prior to using this model, the accuracy of the selected model should be tested using past claim experience.

Solution 9

(a)

i) TAT stands for Turnaround time
TAT is a measure of claims and benefits administration departments responsiveness to provider and member clients
TAT measures the time in calendar days from the receipt of the claim to the final disposition (either payment or denial). It can measure time frames in-between

ii) Considerations for TAT

1) Contractual or regulatory requirements
   - should follow what's written in contract or required by law
   - avoids legal issues rising up
   - helps service metrics

2) MCO Cash Flow
   - MCO may only pay out certain times of the month
   - Want to coordinate – don't want to release payments too early

3) Provider Billing Cycle
   - want to coordinate to meet local billing practices

4) Competitor Practices
   - want to keep up with competition otherwise might lose business to them
   - also leads to better selling point "we have better service than them"

5) Types of Claims (units of work handled)
   - TAT goals for clean claims (all information required received at time of adjudication) typically lower than those for non-clean claims
   - When pend/suspend claims require intervention of other areas, pend type specific TATs are agreed upon between claims and the various support areas

iii) Tools for tracking

1) Pended Claims Report
   - how many claims are pending
   - why are they pending (listing by category)

Solution 9 (continued)

3) Paid Claims report
   - includes list of claims paid in past n days

4) Check Register
   - listing of all claims paid in the next check run
   - how many cheques have been writing and to whom as well as aggregate amount to be paid

5) Lag claims report
   - allows for estimating how long taking claims to be processed

(b)

i) Quality
Financial Accuracy = sum of overpayments and underpayments divided by total claims paid
Industry standard 99.3%

Overall Accuracy = percentage of claims paid correctly in every respect
Industry standard = 95%

Payment Accuracy = percentage of claims paid where the amount was correct but other processing errors identified (ie incorrect payee)
Industry standard = 97%

ii) Steps of claims quality review
1) Develop standards
2) Identify Auditing criteria
3) Set up claims QA worksheet
4) Get report on productivity of examiner (previous days report)
5) Manually and randomly select claims
6) Audit the claim and check results against the adjudication system
7) Fill out QA worksheet
8) Meet with claims examiner and go over any errors found
9) Reach consensus on whether error or not
10) Confirmed errors should be corrected that day with confirmation of fix by reviewing documented in spreadsheet
11) Certain errors may not be adjusted – reviewer to decide
12) If can't reach consensus go to supervisor as tiebreaker
13) Actual errors recorded in log of individual and in aggregate for department
14) If error not attributable to claims examiner, incumbent on review to facilitate solution

Solution 9 (continued)

iii) issues in performing a quality audit
   1) was claimant eligible
   2) what was provider status and payment arrangement
   3) were contractual obligations followed accurately
   4) were written MCO procedures and guidelines followed? Comply with rules even if inappropriate?
   5) Paid amount accurate or coding accurate
   6) Was right person paid

(c) Problems of Claims and Benefit Administration

1) Claims Backlog
- too many claims piling up
- more staff? Insufficient training?
- Maybe due to sudden growth in members?
- stresses on internal services
- potential undetected increase in trend
- inability to accrue expenses properly

2) Utilization Management – Claims Clash
- need to coordinate with both areas
- both areas accuse each other for not communicating, being timely with updates, etc
- need guidelines to be monitored, established and updated
- risk delayed claims, inappropriate or denied claims, increased appeals

3) Informal Benefits Interpretation
- need formal and rationalized approach for benefit interpretation
- risk inconsistent and incorrect decisions resulting in appeals, claims adjustment and litigation

4) Benefit Configuration Problems
- benefit rules set up incorrectly on computer system
- for example incomplete code payments and incorrect co-payment application
- need to fix immediately to avoid pends and mispayments

Solution 9 (continued)

5) Data File integrity issues
- timely and accurate file maintenance is critical
- key files are membership files, provider files, pricing files and code files
- if don't have claims errors and increased pends result
- need to designate "user owner" for each key file and individuals responsible for accuracy, no duplicates and timeliness

6) Outdated Task allocation and workflow
- update to reflect changes in member concentration, provider reimbursement and new lines of business
- when don't synchronize with claims processing needs, backlogs and errors will result

7) Inadequate pended claims management
- need to manage pended claims just as much as new claims
- try to avoid problem pockets
- results in delays, increased complaints, and additional stress between departments

8) Inadequate front-end control
- not entering claims into system within 2 days of receipt
- minimum information needed
- many companies still using paper
- when not managing well, can't function adequately, can't predict IBNR expense

9) Claims Processing system
- good system can increase efficiency and timeliness

10) Upcoding and Unbundling
- providers change ways they code claims coming or unbundling to maximize payment

11) Fraudulent Claims
- fraud on part of employer, employee of group
- fraud on part of employee of insurer

Solution 9 (continued)

(d)

i) enrollment and billing
- eligibility
- what happens if unpaid premiums
- Identification and maintenance of alternate insurance information (COB)

ii) Provider relations
- What if provider not on file?
- What if provider flagged?
- How handle provider claims questions
- What needs to be done to adjust claims?

iii) Utilization management
- matching claims to referral authorization records
- matching claims to pre-certification records
- claims requiring medical review
- what if procedures without prices
- what about experimental procedures

iv) Member services
- how resolve claims questions?
- What about claims adjustments?
- How update member information?

v) Finance
- how handle claims adjustments due to refunds/adjustments and check register
- procedures for audit and reconciliation

Solution 10

(a) Outline of Assumptions:

- Economic assumptions
  - Inflation
  - Investment return
  - Salary increase
  - Social Security increase
- Demographic assumptions
  - Termination/turnover
  - Mortality
  - Disability
  - Retirement incidence
- Additional assumptions
  - Economic
    - Current retiree plan costs
    - Current retiree contributions
    - Health care cost trend
    - Medicare Part B premium rate increase
    - Retiree contribution rate increase
  - Demographic
    - Plan participation
    - Spouse plan continuation after death of retiree
    - Dependent children pan termination
    - HMO penetration
- Selection
  - Economic assumptions should be selected to complement each other
  - Consistent with pension valuation
  - Certain assumptions such as mortality, turnover and retiree incidence must be chosen more carefully
  - What others are doing

Solution 10 (continued)

(b) Plan Costs by Age Group:

Demographics			
Age Group	Number	Relative Value	Plan Cost
65 to 69	200	1.000	1226
70 to 74	400	1.159	1422
75 to 79	300	1.344	1648
80 to 84	100	1.558	1911
Total	1,000	1.223	1500

(c) Financial Impact of Three Possible Outcomes:

Determination that the Plan is actuarially equivalent:

Impact of the federal subsidy will be recognized as a reduction in the Accumulated Postretirement Benefit Obligation (APBO) and amortized as an actuarial gain
Service Cost will be reduced on an ongoing basis

Determination that the Plan is not actuarially equivalent:

No accounting recognition for the subsidy is required, however, FAS (106) results need to reflect any effect of the Act other than the subsidy
Effect may require a restatement of the results

Unable to make a determination:

Defer accounting recognition until a determination of actuarial equivalence can be made
FAS (106) results will need to reflect any effects of the Act other than the subsidy

Solution 11

(a)

Due and Unpaid (D&U) Liabilities - claim adjudicated but not paid.
Example: Check has not been written yet

In Course of Settlement (ICOS) Claims - claim reported but not processed
Example: Claims sitting in claims operations waiting verification of eligibility

Incurred But Not Reported (IBNR) - service performed but claim not received yet
Example: Medical services which have already been provided but which have not yet been billed or submitted to the carrier.
Typically a very large accrual.

Loss Adjustment Expense (LAE) - reserve for future claim processing expenses
Example: Liability developed under the assumption that the administrative expense associated with adjudicating a claim is incurred at the same time as the claim is incurred.

Present Value of Amounts Not Yet Due
Definition: This reserve covers claims that were incurred on or before the valuation date which have not accrued as of the valuation date.
Example: Disability claims of $500 per month beginning midmonth. As of the end of the month, $250 would have accrued and $250 would be not yet due.
The $250 accrued would be either ICOS or D&U depending on payment status.

Resisted Claims - Claims for which a known litigation situation exists.
Example: Claims for which a lawsuit is currently pending.

Outstanding Accounting Feeds - Amounts which have been acknowledged as payments, but for which no check has yet been cut as of the valuation date.
May overlap with D&U.
Example: Pharmacy claims processed at the point of sale yet the carrier billed monthly or bi-monthly for the claims.

(b)

Case Reserves or Direct Enumeration , aka Examiner's method
the ultimate claim amounts to be paid are estimated by knowledgeable personnel
done when volume of claims small
an additional estimate is needed to provide for IBNR

Average size claim method
the number of reported claims are estimated by an average amount paid
not good if much variance

Solution 11 (continued)

Projection Methods

- Estimate a projected incurred claim cost per exposure unit, such as PMPM
- Multiply this value times the exposure base
- Subtract known paid claims
- For coverages with low incidence of claims
- good for reasonableness check of other methods or where data is immature

Loss Ratio Methods

- Estimate a projected loss ratio=Historical or Pricing Assumption
- Multiply loss ratio times exposed earned premium
- Subtract known paid claims
- For new blocks of business without credible history or blocks without exposure information

Tabular Methods

- Apply a continuance table to estimate duration of claims
- Useful for disability and long term care claims.
- Interest discounting will be required in developing the estimated liability
- Can only be applied to reported claims. Additional estimates needed for ICOS and IBNR

Development Methods, aka completion method

- suitable for medical coverages
- Assumes Historical lag pattern w/ modifications-representative of claims incured but not paid
- Requires claim payment data arranged by service date verses payment date – claim triangle

Solution 12

(a) Description:

Ways data can be used

- Premium rating
- Trend analysis
- Reserve calculation
- Network management/ analysis including provider analysis
- Experience monitoring
- Persistency studies
- Analysis of provider reimbursement agreements
- Analysis of the impact of potential changes in coverage
- Analysis of where and how claims dollars are being spent/effect of cost containment
- To assure that proper payment is made to the appropriate party
- Financial and management reporting
- Risk assessment and predictive modeling
- Quality assurance and Quality improvement studies
- To develop capitation rates
- Percentage of paid versus denied claims
- Claims lag time to anticipate incurred but not reported (IBNR) costs
- Monthly and annual receipts
- Number of claims in process
- Claim department productivity

(b) Data Structures & Physical Media

Data Structures

Sequential files

- Each individual data record contains all the data elements needed for a specific processing application

Indexed Sequential Files

- Sequential data records are stored in a direct access media (disk) and indices would be attached to the key elements by which records could be selected (group, member, coverage, etc.)

Relational Databases

- Data elements relative to specific processing functions are grouped into separate tables, with indices for quick access of specific records and indices pointing to tables containing other related elements not needed for the specific process

Solution 12 (continued)

Dimensional Databases

These are a form of relational databases in which the numerical measures associated with the subject ("facts") are aggregated by various attributes ("dimensions")

The facts and dimensions are stored in separate tables, which are indexed to provide for extremely fast query access

Physical Media

On-line

Disk storage that is immediately available to the application

On-line storage may be used for any of the data structures described above

Data that are updated frequently or queried often should be stored on-line

Near-line

Near-line storage is on-line data which has been compressed for more efficient storage, but which can be recalled by the processing application to on-line storage

Near-line disk storage is a compromise between magnetic tape and on-line disk storage

Off-line

Off-line storage utilizes peripherals e.g. magnetic tape or removable disk

Offline storage is less expensive, but is slower to access

Usually used for sequential data structure due to their large size

(c) Considerations in choosing a data structure and storage

Volume of data

Small amounts of data - structure used does not significantly affect the access speed

Large volumes of data - must be structured to minimize processing time and storage costs

Frequency of Use

Data that are updated frequently or are queried often should be stored on-line and structured to allow quick and efficient access

Large volumes of data accessed frequently and/or via complex ways should be stored in fully relational databases

Retrieval Time

Magnetic tape stores data sequentially - difficult and time consuming to search

On-line disk storage allows direct access to records without processing all preceding records - making searches easier and retrievals faster

Solution 12 (continued)

Near-line disk storage is a compromise between magnetic tape and on-line storage

Ease of Programming

When results are required immediately, an easy-to-program data structure may be chosen, although it might require a long execution time

Complex structures may be more difficult to program and maintain, but may provide greater speed and flexibility of access

Solution 13

(a) Insurance Risks

- catastrophes
- fluctuations
- experience rating
- pricing risk
- need for current and frequent experience studies
- lawsuits
- government regulation
- rate guarantees
- expenses
- competition
- investment risk

- surplus requirements also should consider:
  - company risk tolerance
  - ability to assess risk
  - age and sex distribution of policies
  - retention level
  - claims distribution
  - H_4 = Business Risk

$$RBCAC = \frac{1}{2}\left[H_0 + \left(H_1^2 + H_2^2 + H_3^2 + H_4^2 \right)^{\frac{1}{2}} \right]$$

(b)

1. Measuring capital:
   - Risk Based Capital, Formulas vary by users - need modification

   Vitality capital:
   - capital needed to complete strategic objectives: eg. Acquisition, merger, system upgrade, etc.

2. Measuring profit
   - Accounting Basis: statutory vs GAAP
   - Underwriting gain. Do not include Investment Income
   - Operating gain: Include Investment Income
   - Loss Ratios: Using Incurred loss ratio instead of paid loss ratio
   - ROE: Return on Equity = $\frac{GAAP profit}{RBC - surplus}$

Solution 13 (continued)

- ROI: Return on Investment
- Economic Value added: Excess of profit over cost of capital
- Elimination of distortions
  - Reserve adjustment
  - cyclic trend
  - seasonality
- for service business: ASO, IPA
  - profit per employee
  - profit as percentage of sales

3. Measuring growth
- Premium Equivalent
- Risk adjusted premium equivalent
- Asset growth
- Adjust by trend
- other measurers:
  - growth of commissions
  - new sales
  - new employers, new groups
  - growth of membership

(c) Assume:-No free surplus. Book value = RBC
- Dividend is % of Book value = d
- r : Earning as % of Book value
- g : growth rate, % of charge of book value

Year	Year
i	i+1

$$BV_{itl} = BV_i + g_i BV_i = (1+g_i) BV_i$$

$$BV_{itl} = BV_i = r_i \cdot BV_i - d_i BV_i = (1+r_i-d_i) BV_i$$

$$(Hg_{i)} BV_i = (1+r_i-d_i) BV_i$$

$$\therefore g_i = r_i - d_i$$

g : is the maximum of growth rate without external capital

Solution 14

(a) Individual – Age, Sex, Occupation, Income Level, Other Coverage, Benefit Levels, Waiting Periods, Medical History, APSs, Benefit riders, Financial Background, Definition of Disability

Underwriter either rejects or accepts, Field Underwriting is helpful so that agent verifies validity of questionnaire

Group – Age/sex mix, industry, validity of group, participation requirements, group size, past experience, definition of disability,

Group is often guaranteed issue for the individuals within the group

(b) Paul – concern over stability of income, occupation is fine, other coverages,

Leslie – coordination with other coverage, actively at work, does bonus count

(c) Paul – meet elimination period of 1 month. $2,500 per month for 5 years minus the 1 month of waiting period

Leslie
Assume bonus does not count toward disability level
STD for first 4 months
100% of salary for 1st two months – 50,000/12 = $4,166.67
75% of salary for next two month - .75 * 4,116.67 = $3,125
LTD elimination period ends after 4 months and STD discontinues
60% of salary for last 8 months of 1st year = 50,000/12*60% = 2,500
2nd year = 1.03 * $2,500 = $2,575
3rd year = 1.03 * 1.03 * 2,500 = $2,652.25
4th year = 1.03 * 1.03 * 1.03 * 2,500 = $2,3731.82
5th year = 1.03 * 1.03 * 1.03 * 1.03 * 1.03 = $3,813.77

Solution 15

(a)

The value of ER-provided group term insurance over $50,000 is treated as taxable income to the EE. Dengo pays 1x annual salary. No imputed income on AD&D coverage.

Imputed income = (benefit amount over $50k × Table I rate) – EE contribution paid

Use GLD-2, assume rates flat with bands (e.g., same for 15-19)

EE #1: Female, 32. Coverage = $34,000 < $50,000, so no imputed income.

EE #2: Female, 37

Imputed Cost of Coverage
Taxable Coverage = [1 × (96,000 – 50,000)] + (3 × 96,000) = 334,000.
Multiply by Table I rate = 334,000 × $0.09 per $1,000 per month = $30.06 per month.

Less EE contribution
From Table GLD-2: weighted rate = 90% × 50% × (0.100 + 0.054) + 10% × 50% × (0.091 + 0.050) = 0.07635. Round to 0.08.
3 × 96,000 = 288,000
288,000 × $0.08 per $1,000 per month = $23.04

Net imputed income = $30.06 - $23.04 = $7.02 per month.

EE #3: Female, 47.

Imputed Cost of Coverage
Taxable Coverage = [1 × (77,000 – 50,000)] + (1 × 77,000) = 104,000.
Multiply by Table I rate = 104,000 × $0.15 per month = $15.60 per month.

Less EE contribution
From Table GLD-2: weighted rate = 90% × 50% × (0.275 + 0.120) + 10% × 50% × (0.264 + 0.114) = 0.19665. Round to 0.20.
1 × 77,000 = 77,000
77,000 × $0.20 per $1,000 per month = $15.40

Net imputed income = $15.60 - $15.40 = $0.20 per month.

Solution 15 (continued)

EE #4: Male, 37.

Imputed Cost of Coverage
Taxable Coverage = [1 × (78,000 – 50,000)] = 28,000.
Multiply by Table I rate = 28,000 × $0.09 per $1,000 per month = $2.52 per month.

Less EE contribution
No employee contribution.

Net imputed income = $2.52 per month.

EE #5: Ignore imputed income calc for disabled former employees.

Total is $9.74 per month.

(b)

Old Table I rates were often many times higher than plan rates, resulting in higher imputed income amounts. ERs had incentive to consider plan outside Sec 79. New Table I rates are much lower, often less than plan costs. In such cases, ER has incentive to keep plan under Sec. 79, because imputed value is less than offset for EE contrib.

Solution 16

(a)

Reserve = Σ Benefit$_t$ $\times v^t \times c_{x,g,e,t}$

Age at disability = 59.00 years
t = 12 + 10 = 22 months since disability.

Benefit = \$72,000 / 12 × 0.6667 = \$4,000 per month, but after \$1,300 offset for Social Security, net benefit = \$2,700 per month, or \$32,400 per year.

Assume benefit for 12/31/04 already paid. Then, based on assumptions given in question, remaining payments will be end of month (EOM) January 2005, EOM February 2005, and then EOM each February for 2006-2009.

Assume quinquennial termination rates, i.e., age 57 applies to ages 55-59. Then:

t	Termination Rate	Continuance c	Benefit B	Discount Factor v	Product of c,B,v
23	1.00%	0.9900	\$2,700	0.9959	\$2,662.15
24	1.00%	0.9801	\$2,700	0.9919	\$2,624.84
3	10.00%	0.8821	\$32,400	0.9947	\$26,998.34
4	7.00%	0.8203	\$32,400	0.8997	\$23,912.82
5	7.00%	0.7629	\$32,400	0.8568	\$21,179.91
6	6.00%	0.7171	\$32,400	0.8160	\$18,961.07
Total:					\$96,339.14

(b)

Reserve to benefit ratio = \$93,339 / \$2,700 = 35.7.

Typical ratio is 50-60 times.

Lower than typical because not many years of potential benefits left.

Also, elimination period, sex, SS offset (awarded or not) affect reserve to benefit ratio.

Solution 17

(a)

Factors: Benefits:
- benefit triggers
- Benefit period
- elimnation period
- daily benefits
- issue ages
- combination of institutional/non-inst benefits
- nonforfeiture benefit
- inflation indexing method
- indemnity v expense incurred benefits
- lifetime/maximum benefits
- exclusions

Morbidity
- Data Sources
- Integration of coverages
- Reinstatements
- transfers between facilities
- coordination with other coverage
- pre-existing condition limitations
- area
- Policy Options and benefit triggers
- age/gender
- martial status
- morbidity improvement
- impact of u/w
- Marketing
- Claim administration
- Reinsurance
- regulatory consideration

Investment Earnings

Expenses

Voluntary Lapses

Profit

Loss Ratio Requirements

SUBTOTAL

Solution 17 (continued)

(b)

Population v insured data sources
Insured data preferred but WLI product is too new to have own data
Insured source: SOA LTC Experience Committee Intercompany Study
relies on consistent coding
based on date through 1999, therfore >90% of claims are nursing home claims so HH data not very credible
Population Data sources:
National Nursing Home Survey
National Long Term Care Survey
National Home & Hospice Care Survey
Medicare Current Beneficiary Survey

(c)

a) Sales Force
ILCTI is sold primarily through agents
and sometimes direct response chanels

GLCTI is sold primarily through brokers

b) Rating Practices
LTCI premiums are issue age rated similar to LI
however rates are guaranteed renewable and aren't expected to increase with age unlike GLI
ILTCI may include initial rate guarantees of 3-10 years

c) Underwriting Practices
ILCTI is u/w per policy similar to IDI
typical ILTCI u/w includes:
face to face interview
> age 65 and < 65 if not recently seen by Dr.
medical application
telephone verification
medical records/ APS
more u/w on ILTCI as avg issue age much higher than GLTCI
GLCTI is typically GI to these FT AAW ees if enrolled during open enrollment similar to GDI and GLI
spouses of active ee's may have "simplified" u/w

d) Reserving Practices
LTC Reserving is similar to LTD

Solution 18

(a) Pricing Considerations & Impact

1) Adverse Selection
   - Must consider in plans that cover drugs
   - New plans K & L may attract healthier lives
   - Member turnover may cause selection as they choose benefits that best fit their needs
2) Covered Benefits
   - Need to reflect prescription drugs being removed in pricing
3) Traditional Trend
   - Part A—related to Medicare deductible
   - Part B—similar to major med
4) Other Trend
   - Due to anti-selection
5) Member Turnover
6) Commissions
   - Should reflect actual payments to brokers/agents
7) Expenses
   - Should reflect overhead and be reasonable—will have to adjust for new claim costs
8) Mortality & Interest
   - Unaffected by design changes

(b) Data Sources

1) Internal company experience—best source
2) Other insurer's data—may be able to obtain from reinsurer or consultant
3) Government Data
   - CMS trustee's report
   - General population data
   - State gov't and other gov't agencies—reports
4) SOA TSA & RSA
   - Gresch & Leong
5) Health associations (reports/studies)

Solution 19

(a)

Realistic Price Tags:	objective not met - single and family credits are different - 2003 expected claims different from price tags
Equal Credit Allocation:	objective met - all employees get $300
No additional employer cost:	objective not met - credits either equal or exceed price tags for all options - employees get improved plan (Option 3) for no additional out-of-pocket expense
No losers:	objective met - employees in Option 2 get money back (Option 2 is same as previous plan)

(b)

2003 expected employer cost = expected incurred claims + credits - price tags
2003 actual employer cost = actual incurred claims + credits - price tags

	Expected Employer Cost	
Option 1: Single	(250 + 300 - 150) * 50 =	$20,000
Family	(750 + 300 - 150) * 100 =	$90,000
Option 2: Single	(400 + 300 - 250) * 50 =	$22,500
Family	(1200 + 300 - 250) * 50 =	$62,500
Option 3: Single	(500 + 300 - 300) * 100 =	$50,000
Family	(1500 + 300 - 300) * 150 =	$225,000
Total		$470,000

Solution 19 (continued)

	Actual Employer Cost
Option 1:	\$30,000 + (300 - 150) * (50+100) = \$57,500
Option 2:	\$80,000 + (300 - 250) * (50+50) = \$85,000
Option 3:	\$550,000 + (300 - 300) * (100+150) = \$550,000
Total	\$692,500

Note that actual employer cost is much higher than expected cost

(c)

1) Benefits Administrator would like Family Credit approach

- Derive new price tags using actual claims, assuming that Family costs 3 times that of Single coverage, and two years of inflation

Option 1:	50A + 100 x 3A = \$35,000	implies that A = 100
Option 2:	50B + 50 x 3B = \$80,000	implies that B = 400
Option 3:	100C + 150 x 3C = \$550,000	implies that C = 1,000

		Expected Cost (Price Tags)	Credits (Highest Option Family)
Option 1: Single	100 x $(1.05)^2$ =	\$110.25	\$3,307.50
Family	300 x $(1.05)^2$ =	\$330.75	\$3,307.50
Option 2: Single	400 x $(1.05)^2$ =	\$441.00	\$3,307.50
Family	1,200 x $(1.05)^2$ =	\$1,323.00	\$3,307.50
Option 3: Single	1,000 x $(1.05)^2$ =	\$1,102.50	\$3,307.50
Family	3,000 x $(1.05)^2$ =	\$3,307.50	\$3,307.50

- Advantages: - realistic prices
  - no losers
  - equity

- Disadvantages:- much higher costs for employer

Solution 19 (continued)

2) CFO would like Average Credit approach
- from part b) 2003 employer cost is $692,500 and 500 total employees
- therefore, average credit of $1,385 per employee
- price tages are the same as in a)

- Advantages
  - realistic prices
  - no cost increase for employer
  - equity
- Disadvantages
  - some employees can't buy back coverage

3) VP HR would like Actuarial Credit approach
- credits: $692,500 = 200 (Single) × A + 300 (Family) × 3A
  =1,100A
  A=630
  3A=1,890
  therefore credit is $630 for Single and $1,890 for Family

- price tags are the same as in a)

- Advantages
  - realistic prices
  - no cost increase for employer
- Disadvantages
  - some employees can't buy back coverage
  - inequity among employees

(d) Design:
- offer HCEA to encourage employees to self-insure predictable expenses
- group predictable expenses with unpredictable expenses
- 3-6 month waiting period before new benefits
- test with employees before implementation
- parallel design, e.g. attach dental to all options
- limit the frequency of employee's choice, e.g. once every 2 years
- limit the degree of choice
- require evidence of insurability for change/late entrants
- only allow mid-year changing events happen

Pricing:
- age-grading can control costs
- sex/smoker distinct rates can control adverse selection in Employee Life
- subsidization can increase participation through the spread of risks
- don't credit the full amount for the lowest option
- adverse selection should be added to the highest valued option

Solution 20

(a) FAS 112 applies when the 4 conditions are met:

1. Employer's obligation is attributed to employees' services already rendered

2. The obligation relates to rights that vest or accumulate

3. Payment is probable

4. Amount of obligation can be reasonably determined

(b) FAS 112 applies to XYZ because:
- apply to post-employment benefits but before retirement.

Condition 1. YES - based on service rendered.

Condition 2. YES - essentially vested after 2 years
and XYZ pays severance regardless of cause of employee termination

Condition 3. YES payment is probable

Condition 4. YES amount of obligation can be reasonably determined

(c)

Full recognition :

	Obligation/Liability	
Benefit obligation (1-1-)	4,000,000	
2004 benefits earned	500,000	
Interest	190,625	= [4,000,000 - 2004 benefit payout x .5] * 5%
Benefits paid	(375,000)	
Benefit obligation 31-12- (recognized in full)	4,315,625	

Solution 20 (continued)

Deferral

	Obligation/Liability
Benefit obligation (1-1-)	-
2004 benefits earned	500,000
Interest	190,625 = [4,000,000 - 2004 benefit payout x .5] * 5%
Amortization of obligation	500,000 = 4,000,000 / 8 average remaining years
Benefits paid	(375,000)
Benefit obligation 31-12- (recognized)	815,625
Deferred obligation, 31 Dec	3,500,000

Solution 21

(a)

Advantages to XYZ:

Expand benefits with little or no additional cost to employer
Offer new benefits to employees,
Without being locked in a coverage that might appeal to only small segment of the population

Fixed contributions for the employer.
Providing employees with flexibility on how to spend money.
Employer gains control over future cost increases.

Encourage employees to self-insure predictable expenses.

Deliver compensation tax-effectively.

Soften the impact of higher cost sharing.

Disadvantages

More administration.

Inequities:
flat contribution: family does not receive same level of protection.

(b)

Legal requirements for setting up an HCEA

Election must be made prior to the beginning of the year (Annual election).
Changes allowed only for family status change.

One-year roll over or forfeiture:
a) one year roll over of unused balances to next year's account
b) one year roll over of unclaimed expenses for pyt from next year's new balance

Not allow to include both roll-over approaches

Solution 21 (continued)

Use-it-or-lose-it for terminated employees.

Must be employer-only contribution.

(c) **Best choice for John Doe, family coverage**

I) Employee Total Cost for Module 1 - Family status

Claims:	drugs:	$300 - deductible of $100 x 30%	total cost yee:	**160**
	physio:	$150-$100 deduct x 30%	total cost yee:	**115**
	vision:	$300 x 30%	total cost yee:	**90**
	dental exam:	$90 x 2 x 20%	total cost yee:	**36**
	bridge:	$900 (not eligible)	total cost yee:	**900**
	total			**1301**

The cost for the employee is: 1301+700 (price tag) - 1500 (credits) = $ 501

II) Employee Total Cost for Module 2 - Family status

Claims:	drugs:	$300 x10%	total cost yee:	**30**
	physio:	$150 x 10%	total cost yee:	**15**
	vision:	$300 x 10%	total cost yee:	**30**
	dental exam:	$90 x 2 x 0%	total cost yee:	**0**
	bridge:	$900 x 50%	total cost yee:	**450**
	total			**525**

The total cost for the employee is: 525+ 1600 -1500 = $625

The best choice for John Doe is Module 1.

Solution 22

(a)

Test	Worksite
1	+
2	+
3	-
4	-
5	+
6	+
7	-
8	-

Mean of worksite marketing effect =
$(.12+.010-.009-.009+.012+.011-.009-.007)/8=0.1375\%$

Mean response =
$(.012+.01+.009+.009+.012+.011+.009+.007)/8=0.9875\%$

Worksite marketing increases response by .275%
= (1)-(2)
(1) average of 1.125% with worksite marketing
(2) average of .85% without worksite marketing

(b)

ProfitMargin PM = 1-V - (SC/(RR*AF*G))
V=PV of claims and expenses/PV premium = 50+.15=.65
SC=.30
AF=2.5
G=30
Solve for RR = 2.0%: 0.15=1 - 0.65-0.3/(RR*2.5*30)

(c)

Product is generally suited to direct marketing because:

- It's simple
- Low cost
- There is limited underwriting
- Claims administration simple
- Level of anti-selection is generally low
- Popular to be offered through clubs or associations