Fall 2004 Course 5 Written-Answer Solutions

Question #1 Solution

(a) Business overhead expense disability income policy:

- individual health insurance product
- covers normal and customary costs of running and maintaining one's office during a period of disability
- pays the actual share of one insured's costs up to a pre-determined monthly maximum until a maximum multiple of the monthly benefit is paid
- coverage is independent of other disability income products replacing income but is not independent of other business overhead expense policies
- covers rent, utilities, taxes, insurance premiums, depreciation, and employee salaries
- some policies cover salary of temporary replacement
- long elimination period (90 days) and short benefit period (6 to 24 months)
- can buy disability buy-out option: other partners can buy out disabled's share of business

(b) Maximum benefit: $30,000 \times 15 = 450,000$.
Disability period: 26 months
Benefit period: $\text{minimum}\left[24 \text{ months}, 26-3\right] = 23 \text{ months}$
Scenario

I) $\min\left[30,000,\ 36,000\right] \times 23 = 690,000 > \text{max of } 450,000$
Total payout to insured = 450,000

II) $18,000 \times 23 = 414,000 < \text{max of } 450,000$
Total payout: 414,000

III) $22,500 \times 23 = 517,500 > \text{max of } 450,000$
Total payout: 450,000

Question #2 Solution

(a)

- Insurance Companies
  - offer range of life and medical coverage
  - typically indemnity type benefits
- Health Care Service Corporations (HCSOs)
  - write medical and dental coverages
  - not-for-profit
  - most Blue Cross/Blue Shield are HCSOs
- Health Maintenance Organizations (HMOs)
  - offer comprehensive service benefits
  - direct contract with health care providers
  - usually cover a local service area
  - co-payments used, rather than coinsurance/deductible
- Preferred Provider Organizations (PPOs)
  - do not take insurance risk; risk stays with Insurance company/enployer
  - performs utilization review services
  - often two levels of benefits are offered
- Self-Insured Employers
  - employer assumes risk, done to save money (taxes)
  - avoids having to provide state mandated benefits
  - gives greater flexibility
- Provider Organizations (PHO, PSO, PSN)
  - providers accept risk
  - accept capitation and perform admin functions
- Government
  - Medicare
    - ♦ provides medical coverage for elderly and disabled
  - Medicaid
    - ♦ provides health coverage to low income individuals
  - Canadian Medicare

(b)

- Single employer
  - employer is policy holder (contractholder)
  - employees and/or dependents are insured
  - premium is paid by employer and/or employee
  - benefits are paid to employees/dependents
- Multiple employer trusts
  - on insured or self insured basis
  - master trust agreement requires sign of participating employers
  - premiums paid by employer and/or employee
  - benefits paid to employees/dependents

- Labor union groups
  - union is sometimes policy holder
  - benefits sometimes self-insured
  - contract may be issued to trustees of Taft-Harley fund
- Association groups
  - professional or trade associations (e.g. doctors)
  - association is usually policy holder
  - professionals/dependents are insured
  - professionals pay premiums to association
  - association remits premiums to insurance company
- Government related groups
  - contract holder is governmental entity overseeing plan
  - plans may be self insured
  - premiums paid by government unit, or shared with employee covered
  - benefits are paid to covered employees/dependents
- Purchasing Alliances
  - Special multiple employer groups
  - formed under state statutes

Question #3 Solution

(a) To limit effect of mis-representation.

- Strict under-writing – If use medical u/w, hard for policyholder to lie since can review against test result and doctor examination
- Consistent treatment of border line risk
- Audit certain # of policies issued – The problem can be a few agents, so if you audit policyholders (especially those with early claims or high policy values) can identify source and take action
- Post-issue under-writing – More common for group health insurance, but can verify if claimant was really eligible – If not (i.e. misrepresentation at issue) can return premium and cancel policy – Regulatory limit 'contestable period', but can at least review if claim in first few years
- Effective monitoring procedures
- Double check results – compare questionnaire to doctor/nurse observations and effect of lying can have a big impact on resulting mortality, so very important to prevent. Even a small percent of lying can have negative impact on earnings
- Tie agent compensation to results – under-writing bonus

(b) Assumed premium based on actual smokers:

$$(0.30)(5)+(0.70)(3)=3.6$$

If 10% of smokers lied, then you will issue:

$$(0.30)(0.90)(5)+\big(0.7+0.10(0.3)\big)(3)=3.54$$

smokers issued non-smokers issued

Profit loss = 0.06 per 1,000

Question #4 Solution

Entry Age Normal (assume Level $).

$$NC_e \times \ddot{a}_{e:\overline{r-e}|} = B_r \times \frac{D_r^{(\tau)}}{D_e^{(\tau)}} \times \ddot{a}_r^{(12)} = B_r \times v^{r-e} \times {}_e p_r \times \ddot{a}_r^{(12)} \text{ where}$$

$\ddot{a}_{e:\overline{r-e}|} =$ Temporary employment-based life annuity of 1 per year

${}_e p_r =$ prob. of surviving in service to age 65.

For participant *X* at 1/1/05:

$$e = 40 \quad a = \quad x = 40 \quad r = 65 \quad NC\ \ddot{a}_{40:\overline{65-40}|} = B_{65} \times V^{65-40} \times {}_{65-40} p_{40} \times \ddot{a}_{65}^{(12)}$$

$$B_{65} = (0.01)(35,000)\left(\frac{1}{3}\right)\left(1.05^{25} + 1.05^{24} + 1.05^{23}\right)(65-40) = 28,242$$

$$NC_{40}(11.8338) = 28,242\left(\frac{1}{1.07}\right)^{65-40}(0.5040)(9.4131)$$

$$NC_{40} = 2086$$

Use prospective method:

$$AL_x = PV_x FB - NC\ \ddot{a}_{x:\overline{r-x}|}$$

$$= B_r \frac{D_r}{D_x} \times \ddot{a}_r^{(12)} - NC\ \ddot{a}_{x:\overline{r-x}|}$$

$$= B_{65} V^{65-40} \times {}_{65-40} p_{65} \times \ddot{a}_{65}^{(12)} - NC\ \ddot{a}_{40:\overline{65-40}|}$$

$$= 28,242\left(\frac{1}{1.07}\right)^{25} \times (0.5040)(9.4131) - 2086(11.8338)$$

$= 0$ since entered on val date.

For participant *Y* at 1/1/05:

$$e = 40 \quad a = \quad x = 50 \quad r = 65$$

$$B_{65} = (0.01)(50,000)\left(\frac{1}{3}\right)\left(1.05^{15} + 1.05^{14} + 1.05^{13}\right)(65-40) = 24,769$$

$$NC \times \ddot{a}_{40:\overline{65-40}|} = B_{65} \times V^{65-40} \times {}_{65-40} p_{40} \times \ddot{a}_{65}^{(12)}$$

$$NC = \frac{24,769\left(\frac{1}{1.07}\right)^{25}(0.5040)(9.4131)}{11.8338}$$

$$= 1830$$

TNC at 1/1/05 = 1830 + 2086 = 3916

$$AL_x = PV_x FB - NC\ \ddot{a}_{x:\overline{r-x}|}$$

$$= B_r \times \frac{D_r}{D_x} \times \ddot{a}_r^{(12)} - NC\ \ddot{a}_{x:\overline{r-x}|}$$

$$= B_{65} \times V^{65-50} \times {}_{65-50}p_{65} \times \ddot{a}_{65}^{(12)} - NC\ \ddot{a}_{50:\overline{65-50}|}$$

$$= 24,769\left(\frac{1}{1.07}\right)^{15}(0.6547)(9.4131) - 1830(9.1844)$$

$$= 38,518$$

TAL = 0 + 38,518 = 38,518

Question #5 Solution

(a) Simple death benefit: surrender value is paid at the death of policyowner
account value is paid at the death of annuitant

Complex death benefit: GMDB guaranteed minimum death benefit is equal to highest of account value and guaranteed death benefit. There are below combinations of GMDB.

- Premium paid less partial withdrawal
- Premium paid less partial withdrawal and accumulated at certain percentage
- Ratchet feature: death benefit is guaranteed at least equal to highest of previous year guaranteed death benefit and account value. Even if the account value is decreased, the value would not be decreased.
- Step-up feature: GMDB increase at certain percentage each year.
- Combination of above options such as ratchet with step-up feature

While the complex death benefit would be decreased by the percentage of account value withdrawn.

(b) If account value is declining then

for single death benefit, both surrender value and account value in the calculation of death benefit would be decreased accordingly

for complex death benefit

- Premium paid less partial withdrawal are independent of investment performance, so it does not affect
- Similarly, providing accumulation note is not tied to investment performance, it does not affect.
- Ratchet feature would not be affected as mentioned in part (a)
- Step-up feature would not be affected if percentage increased is not affected by investment performance
- The combination would not be affected if individual would not be affected as well.

Question #6 Solution

1) Evaluating internal and external factors
2) Market Research
3) Preliminary Product Design
4) Final Product design
5) Product Implementation
6) Product management

1. Evaluating Internal and External Factor

i) Internal Factor:

- should look into company's mission, vision, corporate strategy, core competencies, target market, etc.
- assess in light of company's strengths and weaknesses and administrative capabilities

ii) External Factors:

a) Economic condition:

- economic condition will affect the pricing assumptions used for different products.

b) Regulation:

- should be reflected in product features and rates.
- should follow the regulation and satisfy the regulator.

c) Taxation

- Tax law changes will affect company's profit
- either increase or decrease the taxes paid and thus affected the pricing assumption used.

d) Competition

- should know other competitors' products, underwriting and etc.

2. Market Research

a) Reasons to do market research:

- to better understand target market's needs
- to track competitor's products, features, service, marketing
- to identify potential target market

b) Timely market research can help to identify:

- pressures to change product feature
- competitors who have changed their underwriting
- competitors who have introduced new sales tools

c) types of information to gather:

- prices (commission, premium)

- underwriting requirements
- product features (guaranteed period etc.)
- sales tools

3. Preliminary Product Design:
    a) Get concensus on most of the product aspects:
        - customer needs
        - distribution needs
        - product features and riders
        - marketing and selling strategies

    b) Determine feasibilities
        i Target Market
        - should fit company's mission, vision, strategy, core competencies, target market and etc.

        ii Regulatory Barriers
        - Is approval uncertain or expensive
        - any special accounting

        iii Implementation Barrier
        - develop or buy new software

        iv Effect on Existing product
        - reduce sales of existing products
        - trigger upgrade to existing products
        - cause agents and customers to trade in old product for new product

    c) Preliminary Pricing. Sales and Profit estimates.
        - Expected Profit margin on limited # of cells
        - Price sensitivity
        - Expected sales: taking from competitor, create new sales
        - Establish assumptions

    d) Cost Benefit Analysis:
        i Cost
        - develop new software
        - software maintenance
        - training staff and agents
        - introducing to distribution system
        - final development
        - product management over lifetime

        ii Benefits:
        - increased profits
        - able to design and sell similar products in future
        - increased sales

- enhanced company image

4. Final Product Design:
    - Review preliminary design and correct any errors or inconsistency
    - get final agreement on product design
    - finalize assumption
    - redo profit testing based on finalized assumption for key cells
    - do profit test for other cells

5. Product implementation:
    - starts early and ends late
    - involve many areas: product management, underwriting, marketing, policy issue investment, and etc.
    - file policy forms with state regulators
    - develop new software
    - train staff and agents

6. Product Management:
    a) Manage sales
        - share new sales ideas with agents
        - find ways to increase sales

    b) Ensure Adequacy of profit:
        - compare actual experience to expected pricing assumptions

    c) Develop pricing Data:
        - to monitor experience like persistency, mortality, expenses, claims
        - so can use to develop future similar products

    d) Ongoing adjustments on product feature
        - important as certain features like interest rates need to be adjusted periodically to reflect the actual experience
        - important for participating product and variable products.

Question #7 Solution

Deductible	over deductible value	deductible value
100	$3498-100\times0.70=3428$	$3500-3428=72$
5100	$2387-5100\times0.09=1928$	$3500-1928=1572$

Old plan the deductible is 1000

The medical claim cost

Under 100	72×0
$100-5100$	$(1572-72)\times0.8$
$5100+0$	$3500-1572$
	$=3128$

New plan	over deductible value	deductible value
200	$3488-200\times0.6=3368$	$3500-3368=132$
$\frac{1400}{0.75}+200=5800$	$2387-5800\times0.09=1865$	$3500-1865=1635$

The medical claim cost

200	132×0
$200-5800$	$(1635-132)\times0.75=1127.25$
$5800+$	$(3500-1635)=1865$
Total	2992.25

The net medical claims change $\frac{2992.25}{3128}-1=-4.34\%$

Question #8 Solution

The types of insurance company risk that are typically addressed by required Capital formulas are:

1. Asset Default Risk
   - i Asset default risk is the risk that an asset permanently loses value
   - ii When asset default its value is removed from the books.
   - iii Will reduce earnings and capital
   - iv Different asset default risks for different types of asset
   - v Each asset has different categories, each with its own probability of default.
   - vi There is no asset default risk associated with policy loans since loans are fully collateralized by cash surrender values and death benefits

$$\text{Asset Default Risk}\,(t) = \text{Asset Default Factor}\,(t) - \text{Pol loan}\,(t)$$

2. Insurance Risk
   - i Insurance risk is the risk that mortality and morbidity experience will exceed those anticipated in pricing
   - ii Insurance risk occurs if there is random fluctuations on incorrect pricing
   - iii fluctuation becomes less significant as the company size increases
   - iv may also include the risk that pricing for persistency, expenses and investment are incorrect. Mortality risk is expressed as a percentage of Death Benefit net of reserves which is the net amount as risk.

$$\text{Mort Risk}\,(t) = \text{Mort Factor}\,(t)\left[\text{DB\_pu}(t) - \text{SolvRes\_pu}(t)\right] \times \text{Surv Factor}\,(t)$$

Morb Risk is expressed as a percentage of premium

$$\text{Morb Risk}\,(t) = \text{Morb Factor}\,(t)\ \text{Prem}\,(t)$$

3. Interest rate Risk consist of: Disintermediation Risk, Guarantee Risk, Liquidity risk
   a) Disintermediation Risk is the risk of having to sell asset at a low value to fund cash outflow. When interest rates rise the following will occur
      - i Policyholder will be able to earn higher rates on new products or new investments
      - ii Company will not be able to match the higher rates.
      - iii Policyholder will loan from, withdraw from, or surrender policies to invest in the products or investments offering the higher rates.
      - iv Large, unexpected cash outflow might cause the company to sell assets invested long term to fund the cash outflows.
      - v Market value of asset invested long term will decrease
      - vi The company will experience large losses when long term invested asset are sold at decreased market values
      - vii The company might experience rating downgrades, will not be able to meet its obligations and hence policyholder will lose confidence. Company might end in insolvency.

b) Guarantee Risk is the risk that interest rate guarantee to policyholders will exceed the interest rate earned on investments
c) Liquidity risk is the risk that assets will not be sold fast enough to fund the cash outflow demands.

4. Interest Spread Risk is the risk that the spread used in pricing will not be sufficient. This occurs when:
   i Poor communication between pricing, administrative and underwriting areas
   ii Insufficient investment opportunities.
   iii Other companies offering competing products at lower rates, hence company will lower its spread to compete.

   $$\text{Interest Spread Risk}\,(t) = \text{Interest spread Factor}\,(t)\left[\text{SolvRes}(t) - \text{PolLoan}(t)\right]$$

5. Other Risks include the following
   i Mis-pricing products
   ii lawsuits against company
   iii changes in tax laws – might cause lapses
   iv adverse publicity – might cause lapses
   v changes in accounting and valuation regulations
   vi expenses rising faster than expected due to inflation or increase in expenses
   vii poor management or company fraud.

Question #9 Solution

- Assume private health care plans in Canada
  - covers benefits that are not covered under provincial plans
  - 2.0% - 2.5% of payroll
  - small deductibles $25 - $50 (smaller than average claim)
  - coinsurance B/W 80% - 100% (100% for preventative care)
  - overall limits – no max on limits because most expensive limits are covered under provincial plans. $1 million limit of claims from outside of Canada
- Eligible expenses
  - hospital services
    - covers cost of semi private room and public ward provided by the provincial plan
    - no max benefit because does not cover chronic health practitioners
    - prescription drugs
    - B/W 50 - 75% of cost of medical plans
    - Definition of prescription drugs
      1. prescribe by physician
      2. allowed drug coverage by law
      3. all drugs that need prescriptions, excluded are dietary substitutes, vaccines and contraceptives (excl oral)
    - can pay pharmacist directly
    - delay – drug plan (insurer pays patient later) – 20% cheaper
    - mail order drugs – cheaper
- Health Practitioners
  - some require prescription from pharmacist (dietician), some do not require prescription from doctor (pharmacist)
  - one treatment per day, with annual maximum
  - if no prescription from doctor could limit cover $(80\%+)$
- Miscellaneous expenses
  - generally expenses incurred because of illness es. ambulance, artificial limb, blood, oxygen
    - don't have maximum or inside limit
    - private duty nurse, dental treatment for accident
    - convalescence home care may have max limits or inside limits
- Out of Canada coverage
  - covers what the provincial plan does not pay
  - emergency care
  - referral
- Exclusion – everything covered under provincial plans funding
  - usually self funded
  - advantages:
    - avoid prem tax

- cash flow advantage
- 1985 – 1991 Quebec didn’t charge sales tax on employer contributions
- large claims are covered in provincial plan

Question #10 Solution

1. Surplus in DB plan – must terminate plan. Congress imposed 20 – 50% excise tax to slow termination

2. DC plans are age-neutral; age neutral plan allows employer to use other incentives for employees to stay

3. Workforce is more mobile and like DC better.

4. DB plans reward long service not performance.

5. DB plans are "golden handcuffs". Older employees will stay instead of leaving early.

6. Perceived Value / Ease of Understanding:
   for younger people like DC because can see advantages

7. Shift investment risk from employer to employee.

8. Employees may value a DC plan more

9. Simpler administration – an advantage for workforce management

Question #11 Solution

In general, lapses vary in the following way:

	In this case:
1. manner in which policy is sold	
2. ability to pay	high ability to pay, wealthy market
3. degree of understanding	sophisticated retirees understand well
4. perceived value	
5. agent's attitude towards persistency	KEY – especially if high commissions
6. customers need for product	need for estate planning – could Δ if tax policy changes
7. ease of premiums payments	

Also:

1. by policy year	
2. by policy size	larger policies lapse less
3. by age	retirees older age less likely to lapse except if high rate increases
4. by method of premium payment	
5. by frequency of premium payment	
6. by risk class	
7. by substandard vs. standard	
8. surrender charges	KEY – higher SC less lapses
9. by rate of premium increase	
10. interest bonus and return of COI charges	KEY

(a)

1 Commissions – high 1st year commissions with lower renewal commissions could cause a problem depending on the agent's attitude towards persistence. He may "churn" business to keep getting access to more high 1st year commissions. If there are lapses in the 1st 3 years however the agent will get a charge back (i.e. he will have to pay back all commission received). Therefore most likely he will try to do all he can to keep policy with company for 1st 3 years. Lapse rates will be low years 1 – 3 but may see a spike depending on agent's attitude.

2 Bonus Refund – get return of COI charges at end of year 25. This is pretty far in the future and therefore will only have effect on long-term lapses. Lapse rate for years 24 – 25 may be very low since people will stick around to get bonus and higher in 26 after receive bonus. Refund of COI bonus and lapses are hard to track.

3 Surrender charges – linearly decreasing lapse rate to 0% year 16. Probably want corresponding increasing linearly lapse rates to account for people surrender more as charge increases with a spike in year 16 when charge = 0.

4 High ratings will cause less lapses as will strong reputation.

5 Affluent, sophisticated buyers tend to buy larger policies and have less lapse rates

6 Established company – people less likely to lapse

(b)

1 Surrender charges allow the company to invest longer term since people are less likely to lapse.
Can invest in more illiquid securities and therefore earn a higher interest rate to be able to credit.
Still want to predict expected liability cash flows so can match as best as possible with asset cash flows and not be subject to liquidity or disintermediation risk.
Investment risk is lowered for the 1st 15 years due to reduced cash flows from the surrender charge. After surrender charge period has expired need to invest in more liquid cash flows.

Question #12 Solution

(a)

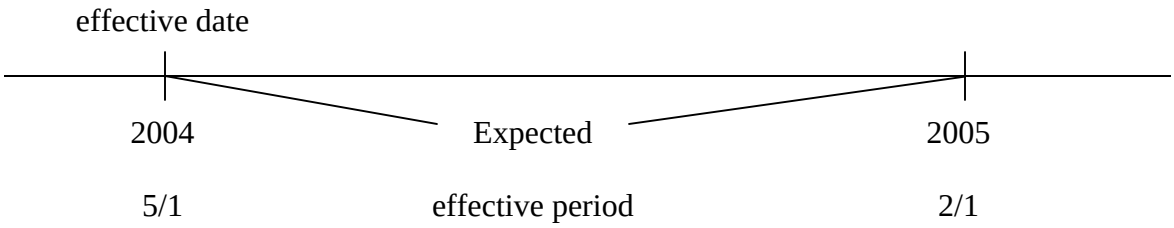
Accident Year	$\frac{1}{0}$	$\frac{2}{1}$
2001	1.19	1.03
2002	1.22	
2003		
Average	1.205	1.03

The expected ultimate incurred losses are as follows:

Accident Year	Expected ultimate incurred losses
2001	12787542
2002	15706193
2003	18385349

Note: $15706193 = 15248731 \times 1.03$
$18385349 = 14813156 \times 1.205 \times 1.03$

(b)



From the above diagram, we can derive the average accident date is 9/16/2004.

For accident year 2002 and 2003, the average accident dates are 7/1/2002 and 7/1/2003, respectively.

1. ultimate incurred losses for year 2002 (trended and developmented)
$= 15706193 \times e^{\delta t}$
$= 15706193 \times e^{0.133 \times \frac{26.5}{12}}$
$= 21068171$

2. ultimate incurred losses for year 2003
$= 18385349 \times e^{\delta t}$

$$= 18385349 \times e^{\frac{14.5}{12} \times 0.133}$$
$$= 21590695$$

3. loss cost for year 2002

$$= \text{ average claim frequency } \times \text{ average claim severity}$$
$$= \frac{\text{Dollars of incurred losses}}{\text{Number of earned exposure units}}$$
$$= \frac{21068171}{107127}$$
$$= 196.66$$

4. loss cost for year 2003

$$= \frac{21590695}{107962}$$
$$= 199.98$$

Taking into account the credibility factor: loss cost per unit of exposure

$$= 196.66 \times 40\% + 199.98 \times 60\%$$
$$= 198.65$$

$$\text{Gross premium rate } = \frac{\text{loss cost}}{1 - \text{ Expense ratio}}$$
$$= 246.77$$

Question #13 Solution

(a)

1 Characteristics of the group
- Demographics (age and gender)
- Ease of administration
- Minimum participation level
- Other considerations (eg. funding alternatives)
- Geographic area
- Company rating and financial strength
- Accessibility of provider
- Health Insurance Portability and Accountability Act (HIPAA)
- Industry
- Carrier persistency
- Stability of work force
- Plan design

2 Plan Design

3 Prior Experience
- Level of credibility
- Loss ratios

4 Developing the proposal
- Basic considerations
- Risk-sharing arrangements
- Performance guarantees
- Expenses
- Funding alternatives

(b)

1 (a)
- important for determining future mortality and morbidity experience of the group
- important for determining size of family group

(b)
- large groups may offer an economies of scale but this may be offset by more complex benefits and customized services
- also concerned about likely quality and timeliness of data collected from employer (eg. employee enrollments, terminations, and status changes).

(c)
- the higher the participation level, the greater the spreading of risk
- allowances are made for individuals receiving cover under a spouse's plan or for optional plans

(d)

- large groups may be self-insured with an ASO contract for financial reasons
- minimum premium plans provide benefits of self-insured plans with downside risk protection
- not usually concerned with individually underwriting members

(e)

- there are significant regional variations in health care practices and prices

(f)

- want a group with a good credit history and a history of making timely payments
- don't want a group that is likely to become insolvent
- a downturn in the employer's fortunes is likely to lead to a surge in disability claims, the use of COBRA continuation services, and a large number of requests for conversion

(h) HIPAA requirements for large groups:

- no evidence of insurability for late entrants
- late entrants who experience a qualifying event should be treated as all other members would
- pre-existing conditions limitations restricted in use

(i) There are significant industry differences in claims due to

- work carried out (eg heavy manual labor) or stress levels
- industry is closely related to lifestyle and socio-economic make-up of the group

(j)

- it takes several years for the insurance company to recoup the acquisition and marketing costs associated with a new group, so persistency of the business is important
- employers also prefer persistency to avoid the disruption of having to switch insurance carriers and provider networks
- groups that go to market every year or every time a rate guarantee expires will find fewer and fewer bidders

(k)

- good plan design can make the plan affordable to both the employer and the employees
- it can also control the risk
- ways plan design controls risk
  - ♦ be aware of competitors when employees have a choice of plans
  - ♦ be aware of outlook for an occupation/industry for disability income
  - ♦ traditional medical plans control risk through deductibles, coinsurance, benefit limits

- for managed care plans, project participation and network access together
- limit benefits for certain risks
- be aware of antiselection caused by choice; for example, with optional benefit amounts; this risk can be reduced by enforcing minimum participation requirements, limiting benefits, reducing benefits for retirees

2 Discussed (2) in part (k) above

3 The larger the group the more credibility will be given to past experience, Manual / community rates will be used for the very smallest groups and rates for the very largest groups will be based entirely on their past experience.
   – for traditional medical plans, one year of experience will be sufficient because of high claim frequency
   – for managed care plans, consider the following:
     - in system usage
     - size of network of providers
     - service area
     - projected group enrollment
     - ease of access to providers and provider contracts
     - plan conditions

Question #14 Solution

(a) Alternative Funding Arrangements

1 May require determination of reserves at policy level
2 Loss of credibility as reserve is based on less data
3 Retropective Premium Arrangements
  – Retro premiums create due and unpaid asset on financial statement
  – Additional premium payable if experience is poor
4 Retrospective Experience Rating Refunds
  – Refund reserve is an additional liability
5 Experience Combinations
  – Surplus on one policy offsets deficit on another
  – Requires category of assets/liabilities called transfers on statement
6 Reserveless Arrangements
  – Policyholder holds the actuarial reserves for a policy
  – Policyholder letter of credit to insurer to secure obligation
  – Includes terminal premium arrangements
  – If unsecured, actuary should determine probability that funds will be recovered
7 Minimum Premium Plan
  – Used to minimize tax to the policyholder
  – Policyholder funds claims with own bank account or reimburses insurer
  – Insurer is not required to report premium equivalents
8 Fee Income
  – Handled similarly to premiums except fees not immediately determinable; fees are often based on a number of transactions

(b) Administrative Arrangements

1 Self Administration
  – Less information with insurer to assess risk being covered
  – Need to consider claims paid by policyholder
2 Third Party Administration
  – Less information
  – Claims paid by TPA
  – May lengthen period from time claim incurred until paid
  – Be aware of differences in processing claims, definition of incurred dates, claims adjudication
  – Audit of self administrator and TPA to protect insurer
3 Amounts on deposit with insurer
  – Rate or Premium Stabilization Reserves
  – Is there a gain or loss on interest credited
4 Amounts held by policyholder
  – Reserves, self funded claims
5 Premium Billing Methods
  – Affect calculation of due premiums or refund reserves
  – Risk of non-payment on delayed premiums

Question #15 Solution

(a) State guaranty funds imdemnify policyholder losses in the event of insolvency. The state guaranty association gets funds from assessments paid by solvent companies in the state. Indemnification may be by payment of claims or cash values, continuing the insolvent company's policies or transferring coverage to a new company with an infusion of funds from the guaranty association. Prior to the NAIC model Act in 1985, the guaranty association in the state of domicile paid all claims. Now guaranty associations are activated in all states where business was written. This increases the capacity of the guaranty association system.

(b) Solvency is the primary concern of reinsurance regulation. Contract and rates are not reviewed by regulators because reinsurance is an agreement between sophisticated parties. Insurance companies that reinsure must comply with reserve requirements in the ceding company's state. Risk transfer is required by NAIC regulation. If a reinsurer is unlicensed, funds must be withheld to get reserve credit. A letter of credit may also be used, but must have an evergreen clause. This clause requires notice if the letter of credit is not renewed. In assumption reinsurance, the policyholder must be notified of the transfer and can elect to stay with the new company or the original company.

Question #16 Solution

(a)

1 Periodic premium
- LTC are mostly daily benefit. LTD are monthly benefit

2 Benefit period
- LTD are paid to certain age or certain period.
- LTC are paid according to benefit amount and total benefit

3 Elimination period: Both are 90 days

4 Optional benefit:
- e.g. cost-of-living adjustment, partial disability

5 Coordination of benefit
- LTD often coordinates with Social Security and Worker Compensation
- LTC often coordinates with Medicare

6 Limitation and exclusion
- Often exclusion self-inflicted and drug-addiction for 2 years.

(b) A/E claim termination rate study

1 Credibility
- must acquire sufficient claim data

2 Type of termination rate
- often include death and recovery

3 Benefit characteristics
- if benefit have high recovery (e.g. maternity) could be higher termination rate.

(c) IBNR using loss ratio method

1 Estimate loss ratio from prior experience

2 Determined expected incurred losses

3 Determine possible liabilities
liabilities = (Expected incurred loss) $\times$ (Loss ratio)

4 Calculate incurred claim paid-to-date

5 IBNR = (Expected incurred loss) $\times$ (Loss ratio) $-$ (incurred claim paid-to-date)

Course 5
Fall 2004

Multiple-Choice Answer Key

1	A
2	C
3	A
4	C
5	D
6	E
7	B
8	E
9	A
10	A
11	A or B
12	A
13	D
14	A
15	B
16	C
17	D
18	D
19	E
20	D
21	C
22	D
23	C
24	D
25	D

26	C
27	B
28	D
29	C
30	C
31	B
32	A
33	E
34	D
35	A
36	E
37	B
38	B
39	B
40	E