11. (2.75 points)

A government insurance panel is considering various alternatives to improve availability of flood insurance for homeowners. A flood catastrophe model indicates the following expected loss costs for the different risk zones:

Risk Zone	Expected Flood Loss Cost (dollars)	Number of Homes (thousands)
A	50	855
B	300	100
C	3,500	45
Total	230	1,000

Market research revealed that homeowners would be willing to pay up to $1,000 per year for flood protection. Any price in excess of that would be regarded as unaffordable.

a. (1.0 point)

Two approaches to offer flood insurance are the optional system and the bundled system. Compare and contrast these two approaches in terms of the following:

i. moral hazard
ii. allocation of cost

b. (1.5 points)

Propose and justify pricing for zones A, B and C which would maximize the number of households covered and discourage development in high-risk zones. Assume no expenses, no profit margin and no competition.

c. (0.25 point)

Identify a policy condition in part b. above which would help discourage development in high-risk zones and encourage loss control.

CONTINUED ON NEXT PAGE

QUESTION 11	
TOTAL POINT VALUE: 2.75	LEARNING OBJECTIVE: B2, B3
SAMPLE ANSWERS	
Part a: 1 point	

- Sample Answer #1
  - i. Moral Hazard
    - Optional would have a higher moral hazard as the insured has more control over purchasing this coverage or not, or adding it later on to an existing policy, whereas with bundled it's just attached to your standard personal property insurance
  - Ii. Allocation of Cost
    - With a bundled system, everyone pays for the losses of few whereas with an optional system you'll have adverse selection from people only adding the coverage if they consider themselves to be a high flood-risk, so the costs would be more concentrated on the high risks and may lead to coverage becoming unaffordable

- Sample Answer #2
  - i. Moral Hazard
    - Optional system is more susceptible to moral hazard. The people at highest risk of flood damage are the most likely to purchase and most likely not to properly prepare their homes for flood damage.
    - In a bundled system everyone has flood coverage, less susceptible to moral hazard since they are not self-selecting coverage
  - Ii. Allocation of Cost
    - In an optional system it is more difficult to allocate cost across book of insureds since only those at risk for flood will buy. Bundled system can spread the cost because everyone has flood, still appropriate allocation however, as highest amount of cost still to flood prone areas

- Sample Answer #3
  - i. Moral Hazard
    - Both optional and bundled systems may cause an insured to be less likely to do their own risk mitigation and more likely to exaggerate claims (as they are both insured), but optional may be more at risk for moral hazard because people knowingly opt-in to it, whereas it is just part of a bundled system
  - Ii. Allocation of Cost
    - Optional systems will allows the insured to pay for their expected loss costs, but bundled will have lower risks subsidizing the loss costs of higher risks

Part b: 1.5 points

- Sample Answer #1

Risk Zone	Expected Losses
A	50 x 855 = 42,750
B	300 x 100 = 30,000
C	3500 x 45 = 157,500
Total	230,250

Pricing
Change C = 1,000, so get 1,000 x 45 = 45,000 in premium from C, means shortfall of 157,500 – 45,000 = 112,500 in overall premium.
B is 6 times the loss cost of A
A x 855 + 6A x 100 = 230,250 – 45,000 = 185,250
1455A = 185,250
A = 127.32
B = 6A = 763.92
Charge A 127, B 764, C 1000, so that coverage is maximized, but level of risk is still reflected to discourage building in C.

- Sample Answer #2

Implement a bundled system where everyone purchases flood that is bundled with their homeowners insurance. Since $1,000 is the maximum an insured will pay, charge full $1,000 for Zone C, the riskiest zone with the fewest homes. Need to allocate the additional cost to the other zones. Increase Zone A & B to $125 above their expected costs. This is a moderate increase when compared to overall homeowners premium.
A = $175, B=$425, C=$1,000

A =	175 x 855	149,625
B =	425 x 100	42,500
C =	1,000 x 45	45,000
		237,125

237,125 / 1,000 = 237 ~ 230

This would be adequate to cover expected losses yet still share cost fairly proportionately across risk zones. The high cost for Zone C discourages away from this high risk zone.

- Sample Answer #3

To maximize the # of households covered, risk Zone C will not be excluded, even though it is very high risk. Since $1k/year is the most that will be paid and zone C costs are $3.5k/year, we will cap Zone C prices at $1k/year. This relatively high price will discourage development in Zone C. Allocate the remaining loss costs of Zone C to Zone B and A.

Total = 230 x 1,000 = 230,000, C = 1,000 x 45 = 45,000. So A + B = 185,000
C's excess loss cost = 2,500 x 45 = 112,500.
A + B # of homes = 855 + 100 = 955, so C's excess loss cost per home = 117.80, add to A and B
A = 167.80
B = 417.80
C = 1,000

Part c: 0.25 point

- Sample Answer #1

Require houses in Zone C to have a flood protection system in place

- Sample Answer #2

Risk-based deductible

- Sample Answer #3

Set a large deductible for Zone C to encourage loss control

EXAMINER'S REPORT

Part a

- Candidates generally did well on this part.
- Candidates were expected to demonstrate knowledge of bundled and optional systems of offering flood insurance coverage.
- The most common error was confusing moral hazard with adverse selection in part i.
- Almost all candidates were able to identify that a bundled system commonly shifts costs from high risk insureds to low risk insureds (a form of subsidization or cost-sharing) and that an optional system fairly allocates costs to risk (high risk insureds pay for the majority of the costs).
- Some candidates used the assumption that the bundled system utilized full risk based pricing for the underlying coverages essentially making the flood component of the premium equivalent to the optional flood coverage. Under this assumption, alternative arguments for moral hazard and allocation of cost were given full credit

Part b

- Most candidates either scored poorly or very well on this part
- Candidates were expected to demonstrate knowledge of methods to discourage development in high risk areas (what motivates customers to reduce risk) while maximizing the uptake of insurance coverage.
- Common errors were:

○ Providing no pricing structure at all ○ Recommending a pricing structure that excluded Zone C and therefore did not maximize the number of households covered ○ Setting the price of Zone C above 1,000 ○ Recommended pricing structure did not balance to an expected flood loss cost of approximately 230 and would therefore generate a profit or loss ○ Failing to justify the proposed pricing model in terms of how it maximizes number of households covered and discourage development in high risk zones
Part c
• Most Candidates received full credit for this part • Candidates were expected to identify a condition of insurance coverage that would motivate customers to reduce their risk. • The most common error was stating that coverage would be excluded from Zone C, whereas the part asked for a policy condition and not a risk selection/underwriting rule