

Exam HECON4210. Spring 2026.

Grading Key

Exercise 1: Short Questions (34%). 8 questions, equal weight

All questions are True/False. 1 pt for correct T/F, remaining points for explanation.

1.1 – FALSE

A good answer should include:

- Optimal health H^* varies across individuals because they differ in wages, education, depreciation rates (age), and other characteristics.
- These differences shift the MEC curve or the user cost of health capital, leading to different equilibrium H^* .

1.2 – FALSE

A good answer should include:

- Aging increases the depreciation rate δ , which raises the user cost of health capital ($r + \delta$).
- This **unambiguously** reduces H^* : there is no offsetting channel.
- Contrast with wages, where the effect IS ambiguous: a higher wage raises both the return to healthy time (investment channel, H^* up) and the opportunity cost of time spent on health production (cost channel, H^* down).

1.3 – TRUE

A good answer should include:

- With perfect complements, $h = A \min\{\gamma(\bar{I}_1 + \mu_1), (1 - \gamma)I_2\}$. Optimality requires $\gamma(\bar{I}_1 + \mu_1) = (1 - \gamma)I_2$.
- A positive shock $\mu_1 > 0$ raises the first argument, so parents must increase I_2 to maintain the balance. This is a reinforcing response.

1.4 – FALSE

A good answer should include:

- With substitutes ($\phi > 0$), parents *compensate*: the intervention raises μ_1 , and parents respond by *reducing* I_2 .
- The reduced-form estimate captures the biological improvement *minus* the compensating parental response, so it **understates** (not overstates) the pure biological effect.
- Contrast with complements ($\phi < 0$), where parents reinforce and the reduced-form overstates.

1.5 – TRUE

A good answer should include:

- Concavity ($U'' < 0$) is equivalent to risk aversion.
- By Jensen's inequality: $U(E[I]) > E[U(I)]$, so the consumer prefers the certain income $E[I]$ to the gamble.

1.6 – FALSE

A good answer should include:

- A pooling equilibrium can *never* be a Rothschild–Stiglitz equilibrium.
- A deviating insurer can always offer a contract that attracts only low-risk types (cream-skimming), making a profit on them while leaving the pooling insurer with disproportionately high-risk enrollees at a loss.

1.7 – FALSE

A good answer should include:

- Even with positive administrative costs, a mandate *can* be welfare-improving under adverse selection if the welfare gain from reducing under-insurance (the adverse selection DWL) outweighs the additional administrative costs of covering more people.
- The statement “can never” is too strong. It depends on the relative size of the selection distortion and the administrative costs.

1.8 – TRUE

A good answer should include:

- Higher cost-sharing did substantially reduce utilization (the 95% coinsurance plan had roughly 39% lower spending than the free-care plan).
- Health outcomes were largely unaffected for the average participant.

- A strong answer may note exceptions for some subgroups (low-income, hypertensive).

Exercise 2: Risk, Insurance, and Selection (33%)

Equal weight per sub-question.

(a) Risk premium

A good answer should include:

- The risk premium π is defined by $\pi = E[I] - CE$, where CE is the certainty equivalent, i.e. the certain income satisfying $U(CE) = E[U(I)]$.
- For a risk-averse consumer: U is concave, so $U(E[I]) > E[U(I)]$ (Jensen's inequality), which implies $CE < E[I]$ and $\pi > 0$.
- The consumer is willing to pay up to $pL + \pi$ for insurance, which is more than the actuarially fair premium pL .

(b) Single risk type: equilibrium and welfare gain

A good answer should include:

- A diagram with endowment $E = (Y, Y - L)$ below the 45-degree line, the fair-odds line through E with slope $-(1 - p)/p$, and the 45-degree line ($I_H = I_S$).
- With perfect competition and a single type, the equilibrium is actuarially fair full insurance at $F = (Y - pL, Y - pL)$, where the fair-odds line meets the 45-degree line.
- The welfare gain relative to no insurance: the consumer moves from the risky endowment E to the certain income $Y - pL$. Since $U(Y - pL) > E[U(I)]$ (by concavity), the consumer is strictly better off. The welfare gain equals the risk premium π in monetary terms.

(c) Separating Rothschild–Stiglitz equilibrium

A good answer should include:

- **High-risk types** get actuarially fair, **full** insurance (contract on the 45-degree line, premium = $p_H L$).
- **Low-risk types** get actuarially fair but **partial** insurance (not on the 45-degree line, less than full coverage).
- Low-risk types cannot get full insurance because of the **incentive-compatibility constraint**: if low-risk types were offered full fair insurance at rate p_L , high-risk types would prefer that cheaper contract. To prevent this, the low-risk contract must offer less coverage, just enough that high-risk types weakly prefer their own full-insurance contract.

(d) Einav–Finkelstein framework and advantageous selection

A good answer should include:

- A diagram with downward-sloping demand, MC, and AC curves, where AC lies above MC (adverse selection).
- Competitive equilibrium at $P = AC$ (where demand intersects AC), with quantity Q_{CE} .
- Efficient quantity Q_E where demand = MC (larger than Q_{CE}).
- Deadweight loss: the triangle between demand and MC from Q_{CE} to Q_E . These are trades where willingness to pay exceeds marginal cost but do not occur because the competitive price (set at AC) is too high.
- **Advantageous selection:** when lower-risk individuals have *higher* willingness to pay (e.g., because they are more risk-averse). Then MC is upward-sloping rather than downward-sloping, and the competitive equilibrium may feature over-insurance rather than under-insurance. A mandate could reduce welfare in this case.

Exercise 3: Moral hazard and insurance design (33%)

Equal weight per sub-question.

(a) Social loss from moral hazard

A good answer should include:

- A diagram with the downward-sloping demand curve for healthcare, the price without insurance P_U (= marginal cost), and the price with insurance $P_I < P_U$.
- Without insurance, quantity consumed is Q_U where willingness to pay equals marginal cost. With insurance, quantity increases to Q_I where willingness to pay equals the insured price.
- The social loss is the area between the demand curve and the marginal cost line, from Q_U to Q_I : these additional units cost more to produce than the consumer values them, but are consumed because insurance lowers the out-of-pocket price.
- The social loss is larger when (i) the price distortion ($P_U - P_I$) is larger, and (ii) demand is more price-elastic.

(b) Pauly optimal copayments

A good answer should include:

- The Pauly tradeoff: copayments reduce moral hazard (efficiency gain) but expose consumers to financial risk (loss of risk protection). The optimal copayment balances these

two forces.

- **Risk aversion:** more risk-averse consumers value risk protection more $\Rightarrow$ optimal copayment is **lower** (more generous insurance).
- **Price sensitivity (elasticity):** more price-sensitive demand $\Rightarrow$ larger behavioral response to insurance $\Rightarrow$ moral hazard problem is bigger $\Rightarrow$ optimal copayment is **higher** (less generous insurance).
- It follows that full insurance is not optimal when demand is price-sensitive: moral hazard losses would outweigh the risk-protection gains.

(c) Behavioral hazard vs. standard moral hazard

A good answer should include:

- In the standard moral hazard model, the demand curve reflects the true marginal benefit of care. The welfare cost of insurance comes from overconsumption: insured patients consume care where their true benefit is below the social cost.
- In the behavioral hazard model (BMS 2015), the demand curve does *not* reflect true marginal benefit. Behavioral biases (present bias, limited attention, false beliefs, symptom salience) drive a wedge ε between perceived and true benefit.
- The decision rule becomes “treat if $b + \varepsilon > p$ ” instead of “treat if $b > p$ ”. This means patients may overuse some treatments ($\varepsilon > 0$) and underuse others ($\varepsilon < 0$).
- Because demand is no longer informative about true benefit, observing the demand response to a price change is not sufficient to evaluate welfare. Health outcome data is also needed.

(d) Freedonia: copayment policy

A good answer should include:

- **Standard model rationale:** zero copayments lead to overconsumption of care where willingness to pay is below cost. Introducing copayments reduces moral hazard and spending.
- **Behavioral hazard refinement:** optimal copayments should vary by treatment type because the behavioral wedge ε varies. Empirical evidence (e.g., from RAND) shows that patients cut high-value and low-value care roughly equally when copayments rise, so uniform copayments are a blunt instrument.
- **High copayments for:** elective procedures with low clinical value, imaging for uncomplicated conditions, brand-name drugs with generic equivalents. These are treatments where demand reflects or overstates true benefit ($\varepsilon \geq 0$).

- **Low/zero copayments** for: chronic disease medications (statins, anti-hypertensives, insulin), preventive care (vaccinations, screening). These are treatments where patients underuse relative to true benefit ($\varepsilon < 0$) due to present bias, forgetting, or limited attention.
- This is the logic behind **Value-Based Insurance Design (VBID)**: copayments based on clinical value rather than uniform cost-sharing.