LECTURE 8 NOTES: HEALTH EQUITY

(A) BECKER (1957) [10-15 MINS] from LABOR ECON

employer utility $U_e = U_e(\pi, L_{VRM})$

π: profits; L_{VRM}: disutility from exposure to racialized/marginalized group (L for labor)

$\partial U_e / \partial L_{VRM} < 0 \Rightarrow$ YIKES!

employee productivity: $\pi = f(L_{MAJ} + L_{VRM}) - wL_{MAJ} - W_{VRM} L_{VRM}$

(w normalized to 1; W_{VRM} as % of w.)

If $U_e = \pi - d_e L_{VRM}$, what is optimal (L_{MAJ}, L_{VRM})?

$\partial U_e / \partial L_{MAJ} \Rightarrow f'(\cdot) - w = 0 \Rightarrow$ hence, $f' = 1$

$\partial U_e / \partial L_{VRM} \Rightarrow f'(\cdot) - w_{VRM} - d_e = 0 \Rightarrow$ hence $\boxed{W^*_{VRM} = 1 - d_e}$

wage gap!

- What if $d_e \sim F$(employers) randomly?
  - $\Rightarrow$ Separating eqbm! Some hire VRM only at $1 - d_e$, some hire MAJ
- What about dynamics?
  - Should push towards a separating eqbm as well!
  - Firms enter, exit market based on d_e and labor supply.

(B) BALSA + McGUIRE (2001, 2003)

Primitives

- 1 (majority group) MD – why in the majority?
- 1 illness with severity $Z \sim N(\mu_Z, \sigma_Z^2)$
- MD observes signal $S = Z + \epsilon$, $\epsilon \sim N(0, \sigma_\epsilon^2)$

hence $S \sim N(\mu_Z, \sigma_Z^2 + \sigma_\epsilon^2)$

(μ_Z: unbiased; $\sigma_Z^2 + \sigma_\epsilon^2$: noisy $\Rightarrow$ increases w/ σ_ϵ^2.)

MAIN ASSUMPTION: $\epsilon_{MAJ} = 0$, $\epsilon_{VRM} > 0$.

BALSA + McGUIRE, continued

MD Beliefs

priors: μ_z Signal: s Posteriors: $E[z|s] = \underbrace{(1-\beta)\mu_z}_{\text{weight on prior}} + \beta s$ ← weight on signal

where $\beta = \dfrac{\sigma_z^2}{\sigma_z^2 + \sigma_\epsilon^2}$

- FOR MAJ: $\beta = 1 \Rightarrow$ believe the (perfect) signal
- FOR URM: $\beta < 1 \Rightarrow$ don't (fully) believe the patient

$\Rightarrow$ MD chooses a treatment threshold s^* to max patient U

PATIENT UTILITY

$$u_p = \begin{cases} -b & \text{treated} \leftarrow \text{cost of treatment} \\ -az & \text{not treated} \leftarrow \text{illness costs} \end{cases}$$

What is the decision rule?

$$\begin{aligned} E[B] &= E[az-b] \\ &= aE[z]-b \\ &= aE[z|s]-b \\ &= a[(1-\beta)\mu_z+\beta s]-b \end{aligned}$$

optimal treatment is where $E(B)$ is maximized: $s^* = \dfrac{dE[B]}{ds} = 0$

$$s^* = \frac{b-a(1-\beta)\mu_z}{a\beta}$$

How do signals differ? $\boxed{s^*_{MAJ} = \dfrac{b}{a\beta} = \dfrac{b}{a}}$

s^*_{URM}: $\beta < 1$ so note

$$\frac{b-a(1-\beta)\mu_z}{a\beta} \gtrless \frac{b}{a}$$

when is $s^*_{URM} \geq s^*_{MAJ}$ (loss in access)?

$$b-a(1-\beta)\mu_z \geq b\beta$$

$$\Leftrightarrow -a(1-\beta)\mu_z \geq b(\beta-1)$$

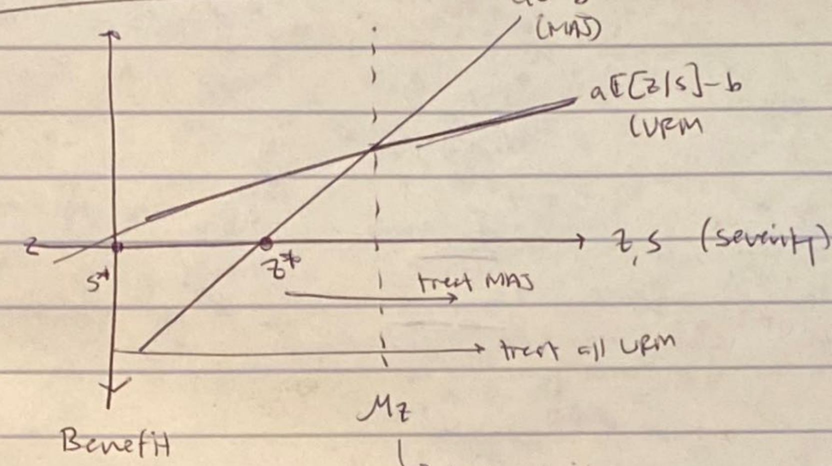
$$-a\mu_z \geq -b$$

$$\boxed{\mu_z \leq \frac{b}{a}} \longrightarrow \boxed{\text{when avg treatment is helpful, URM gets more treatment}}$$

Realistic?

BALSA + MCGUIRE

Who gets treated?



↳ treatment is on average good!

What about outcomes?

$$E[B(s^*)] = \int_{s^*}^{\infty} E[B]\, \underbrace{g(s)}_{\text{distribution of signals}}\, ds$$

if $s^* < z^*$ some are treated unnecessarily (are these "mistakes")?

$$= [a\mu - b]\left[1 - \Phi\left(\frac{s^* - \mu}{\sigma_s^2}\right)\right] + \alpha\beta\sigma_s \cdot \Phi\left(\frac{s^* - \mu}{\sigma_s^2}\right)$$

as $\beta \uparrow$ (move closer to z^*), $EB \uparrow$

↳ how might this change demand or compliance from URM?

Three cases:
1. Prejudice
2. Stereotypes
3. Clinical uncertainty

1. Like Becker

2. Stereotypes:

MD effort: $e^D \in \{0, 1\}$

Patient effort: $e^P \in \{e_L, 1\}$

↳ costs (c^D, c^P)

] benefit is $z \cdot e^D \cdot e^P$

BALSA + MCGUIRE continued

2 × 2 GAME THEORY:

Patient	e_H^D	e_L^D
COOPERATE	$(Z-c^P,\ \underline{Z-c^D})$ >0	$(-c^P,\ 0)$
$\bar{C}$	$(Ze_L,\ \underline{Ze_L-c^D})$ <0	$(\underline{0},\ \underline{0})$

assume

How to find eqbm? Take other's choice as given!

Pat
1. If $e^D = e_H$, then cooperates if $Z - c^P > Ze_L$
2. If $e^D = e_L$ then never cooperates

MD
1. If $e^P = 1$, then $e^D = e^H$
2. If $e^P = e_L$, then $e^D = e^L$

★ So $(0,0)$ is an outcome, as is (Cooperate, e_H) if $Z - c_p > Ze_L$.
⇒ Coordination failures!

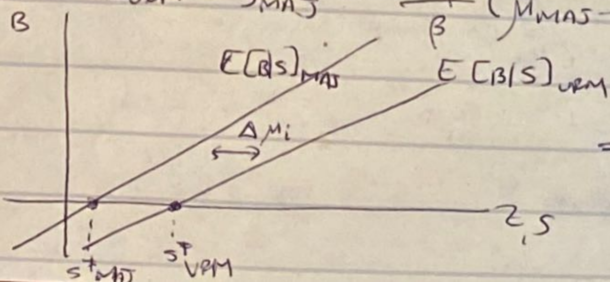
★ How would stereotypes affect this?

3. Clinical uncertainty: what if μ_Z is different for MAJ and URM?
- race-based risk differences [$\mu_{URM} > \mu_{MAJ}$]
- others?

→ now let ε be same for MAJ + URM

→ treatment thresholds are the same: $S_i^* = -(1-\beta)\mu_i/\beta$ [$a \equiv 1$]

→ hence $S_{URM}^* - S_{MAJ}^* = \frac{1-\beta}{\beta}(\mu_{MAJ} - \mu_{URM})$ [should flip if $\mu_B > \mu_W$]



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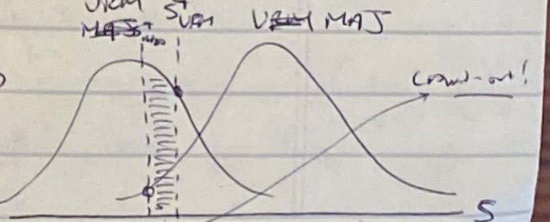


LECTURE 8: HEALTH EQUITY

(A) Becker (1957)

$$U_e = U_e(\underset{\substack{\uparrow \\ \text{profits}}}{\pi}, \underset{\substack{\nwarrow \\ \text{URM Labor}}}{L_{URM}}) \text{ with } \frac{\partial U_e'}{\partial L_{URM}} < 0$$

$$\pi = \underbrace{f(L_{MAJ} + L_{URM})}_{\text{total labor supply}} - wL_{MAJ} - w_{URM}L_{URM}$$

two wages $\quad (w \equiv 1)$

Assume $U_e = \pi - d_e L_{URM}$

MAX U_e : $\frac{\partial U_e}{\partial L_{MAJ}} = f'(\cdot) - 1 \equiv 0 \Rightarrow \boxed{f'(L_{MAJ} + L_{URM}) = 1}$
(L_{URM})

$$\frac{\partial U_e}{\partial L_{URM}} = f'(\cdot) - w_{URM} - d_e = 0 \Rightarrow$$

$$\boxed{w^*_{URM} = \underbrace{f'(\cdot)}_{1} - d_e}$$

(B) Balsa + McGuire

- Underlying severity $z \sim N(\mu_z, \sigma_z^2)$
- MD signal: $S \sim N(\mu_z, \sigma_z^2 + \sigma_\varepsilon^2)$

$$S = z + \varepsilon, \quad \varepsilon \sim N(0, \sigma_\varepsilon^2)$$

$$\varepsilon_{MAJ} = 0 \Rightarrow S_{MAJ} = z$$

$$\varepsilon_{URM} \neq 0 \Rightarrow S_{URM} = z + \varepsilon$$

- MD's beliefs: priors: μ_z, signal: S $\Big\} \Rightarrow$ posterior beliefs

$$E[z|S] = (1-\beta)\mu_z + \beta S$$

where $\beta = \dfrac{\sigma_z^2}{\sigma_z^2 + \sigma_\varepsilon^2}$

For MAJ, $\sigma^2_\epsilon = 0$, so $\beta = 1$, so $\mathbb{E}[z|s] = s$

For MIN: $\sigma^2_\epsilon \neq 0$, $\beta \to 0$, so $\mathbb{E}[z|s]_{URM} = (1-\beta)\mu + \beta s$

PATIENT UTILITY

expected benefit of treatment:

$$\cancel{\mathbb{E}[B] = az - b}$$

$$\mathbb{E}[B] = a\mathbb{E}[z] - b$$

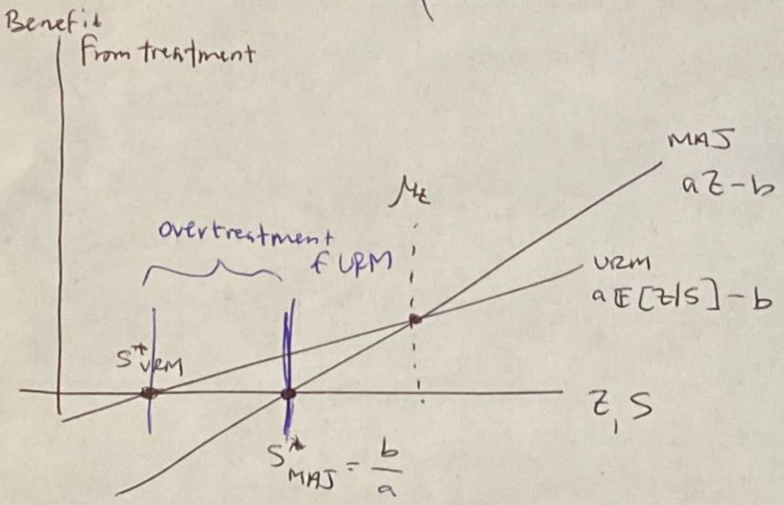
for MD:

$$\mathbb{E}[B|s] = a\,\mathbb{E}[z|s] - b$$
$$= a\left[(1-\beta)\mu + \beta s\right] - b$$

treat if $a[(1-\beta)\mu + \beta s] - b \geq 0$

defines s^* cutoff

$$\boxed{s^* = \frac{b - a(1-\beta)\mu}{a\beta}}$$



Under what condition would $s^*_{URM} \leq s^*_{MAJ}$?

$$\frac{b - a(1-\beta)\mu}{a\beta} \leq \frac{b}{a} \iff \boxed{\mu_z \geq \frac{b}{a}}$$

BALSA + MCGUIRE (2003)

Stereotypes: two players in game: patients + doctors

- MD exert effort $e^D \in \{0, 1\}$
- Patients choose cooperation: $e^P \in \{e_L, 1\}$
- both have costs $e^D = 1 \Rightarrow c_D$

  $e^P = 1 \Rightarrow c_P$

Payoff matrix:

	$e_D = 1$	$e_D = 0$
$e^P = 1$	$(Z - e^P, Z - c^D)$	$(-c_P, 0)$
$e^P = e_L$	$(Ze^L - \cancel{e^P}, Ze^L - c^D)$	$(0, 0)$

Assume $Z - c^D > 0$

$Ze^L - c^D < 0$

Balsa + McGuire (2001)