MT 2 Exam

Answers Question 1

a. $\frac{MU_l}{MU_c} = \frac{1}{2}\frac{1}{\sqrt{l}}$ $RW = \frac{1}{2}\frac{1}{\sqrt{l}}\bigg|_{l=T, c=\frac{V}{p}} = \frac{1}{2}\frac{1}{\sqrt{T}}$ $\frac{\partial RW}{\partial V} = 0$ $\frac{\partial RW}{\partial T} < 0$

$RW < w \to \frac{1}{2}\frac{1}{\sqrt{T}} < w \to w^2 > \frac{1}{4T}$

b. $U = \sqrt{l} + c$; $T = h + l$; $pc = wh + V$ $\frac{\partial U}{\partial l} = \frac{1}{2}\frac{1}{\sqrt{l}} = MU_l$ $\frac{\partial U}{\partial c} = 1 = MU_c$

$$\Gamma = U + \lambda[w(T-l) + V - pc]$$

$$\frac{\partial \Gamma}{\partial l} = MU_l - \lambda w = 0 \ldots.(1)$$

$$\to pMU_l = \lambda w$$

$$\frac{\partial \Gamma}{\partial c} = MU_c - \lambda p = 0 \ldots.(2) \to MU_c = \lambda p \to \frac{1}{2}\frac{1}{\sqrt{l^*}} = \frac{w}{p} \to l^* = \frac{p^2}{4w^2}$$

$$\ldots\ldots\ldots..(4)$$

$$\frac{\partial \Gamma}{\partial \lambda} = 0 \Rightarrow w(T - l^*) + V - pc^* = 0 \ldots\ldots..(3)$$

$$l^* = \frac{p^2}{4w^2}$$

$$pc^* = w(T - l^*) + V \to pc^* = wT + V - wl^* \to c^* = \frac{wT+V}{p} - \frac{w}{p}l^* \to c^* = \frac{wT+V}{p} - \frac{w}{p}\frac{p}{4w^2}$$

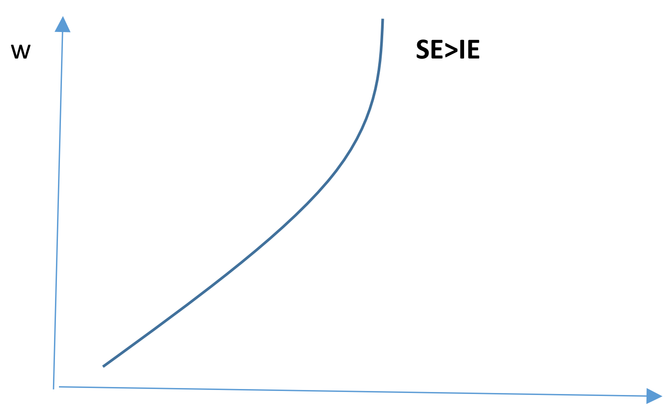
$$c^* = \frac{wT+V}{p} - \frac{1}{4w}$$

$$U^* = \sqrt{l^*} + c^*$$

h* = T-l* will give Labor Supply Function.

$$h^* = T - l^* = T - \frac{p^2}{4w^2}$$

c. $\frac{\partial h^*}{\partial w} = \frac{p^2}{2w^4} > 0$; $\varepsilon^S = \frac{w}{h^*}\frac{\partial h^*}{\partial w} = \frac{w}{h^*} \times \frac{p^2}{2w^4} > 0$



GRAPH 1

Answers Question 2

Baseline Budget Equation:

$$pc = w(T-l)+V$$

Baseline Slope $\frac{\partial c}{\partial l} = -\frac{w}{p}$

Baseline Horizontal/Vertical Intercept 1 $l = T; c = \frac{V}{p}$

Baseline Horizontal/Vertical Intercept 2 $l = 0; c = \frac{wT+V}{p}$

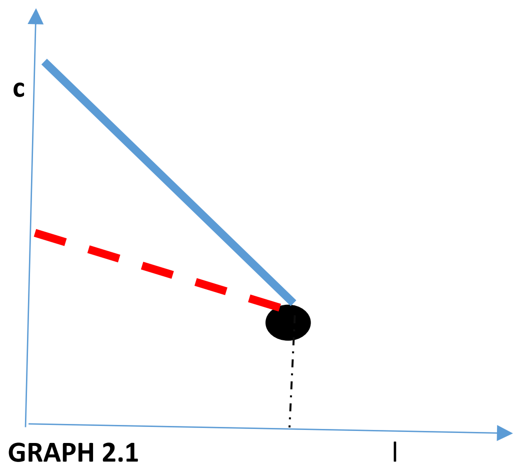
Situation 1 Budget Equation:

$$pc = (1-\tau)w(T-l)+V$$

Baseline Slope $\frac{\partial c}{\partial l} = -\frac{(1-\tau)w}{p}$

Baseline Horizontal/Vertical Intercept 1 $l = T; c = \frac{V}{p}$

Baseline Horizontal/Vertical Intercept 2 $l = 0; c = \frac{(1-\tau)wT+V}{p}$



GRAPH 2.1

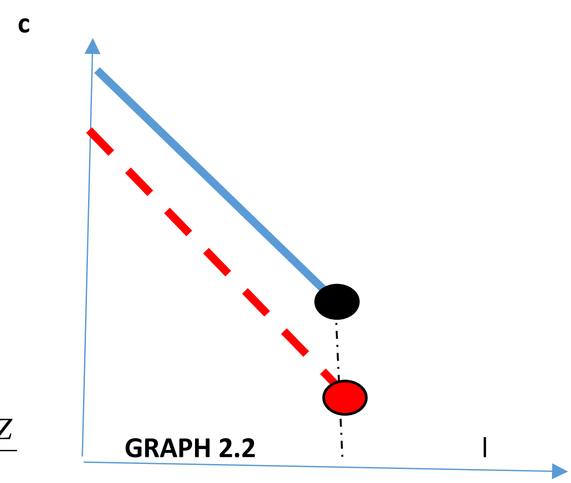
Situation 2 Budget Equation:

$$pc = w(T-l)+V-Z$$

Baseline Slope $\frac{\partial c}{\partial l} = -\frac{w}{p}$

Baseline Horizontal/Vertical Intercept 1 $l = T; c = \frac{V-Z}{p}$

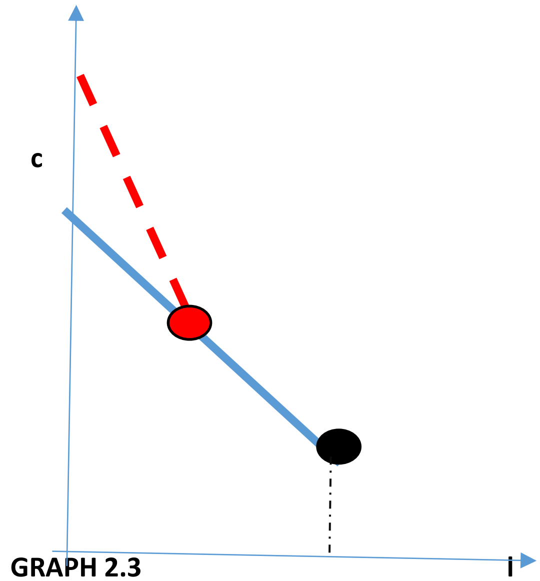
Baseline Horizontal/Vertical Intercept 2 $l = 0; c = \frac{wT+V-Z}{p}$



GRAPH 2.2

Situation 3 Budget Equation:

Baseline Slope $\frac{\partial c}{\partial l} = -\frac{w}{p}$ if $h \le \hat{h}$; $\frac{\partial c}{\partial l} = -\frac{\hat{w}}{p}$ if $h > \hat{h}$



GRAPH 2.3

Question 3

a.

$$h^* = T - \frac{1}{2w^2}$$

$$E^* = \frac{\alpha}{w^2}$$

$$\exists\ w = w^* \ni E^* = h^* = N^*$$

$$\frac{\alpha}{w^2} = T - \frac{1}{2w^2} \rightarrow \frac{\alpha}{w^2} + \frac{1}{2w^2} = T \rightarrow \frac{1}{w^2}\left(\alpha + \frac{1}{2}\right) = T \rightarrow w^2 = \frac{1+2\alpha}{2T}$$

$$w^* = \sqrt{\frac{(1+2\alpha)}{2T}}$$

$$N^* = \frac{\alpha}{w^2} = \frac{\alpha}{\frac{1+2\alpha}{2T}} = \frac{\alpha 2T}{1+2\alpha}$$

Explanation for part b and c

α is the shift parameter for the demand curve. It indicates increase in productivity. So, increase in α increases wages and increases employment (shift in demand curve to the right; holding supply constant).

Higher T reduces RW and creates more incentive to work i.e. labor supply shifts to the right (holding demand constant), decreasing the wages and increasing employment.

b.

$$w^* = \sqrt{\frac{(1+2\alpha)}{2T}} \rightarrow \log w^* = \frac{1}{2}(\log(1+2\alpha) - \log 2T)$$

$$\frac{1}{w^*}\frac{\partial w^*}{\partial \alpha} = \frac{\partial}{\partial \alpha}\left(\frac{1}{2}\log(1+2\alpha) - \frac{1}{2}\log 2T\right) = \frac{1}{(1+2\alpha)} > 0$$

$$\frac{1}{w^*}\frac{\partial w^*}{\partial T} = \frac{\partial}{\partial T}\left(\frac{1}{2}\log(1+2\alpha) - \frac{1}{2}\log 2T\right) = -\frac{1}{T} < 0$$

c.

$$N^* = \frac{\alpha 2T}{(1+2\alpha)} \rightarrow \log N^* = \log \alpha + \log 2T - \log(1+2\alpha)$$

$$\frac{1}{N^*}\frac{\partial N^*}{\partial \alpha} = \frac{\partial}{\partial \alpha}(\log \alpha + \log 2T - \log(1+2\alpha)) = \frac{1}{\alpha} - \frac{2}{(1+2\alpha)} = \frac{1}{\alpha(1+2\alpha)} > 0$$

$$\frac{1}{N^*}\frac{\partial N^*}{\partial T} = \frac{\partial}{\partial T}(\log \alpha + \log 2T - \log(1+2\alpha)) = \frac{2}{T} > 0$$

Answer 4

a. In a couple of sentences/bullet points explain what is the instrumental variable in **"Vive Le Revolution" (Maurin & McNally)** paper & which variable is instrumented? Why is the instrumental variable strong and why is it exogenous?

- Cohorts born in 1948, 1949, 1950 serve as the instruments & years of schooling is instrumented. The instrumental variable is strong because if you were part of the above mentioned cohorts, you will have easier path to enter university than other cohorts (people born in 1946, 1952) because of the student revolution.
- It is exogenous because student revolution was a one time shock; no one anticipated it. Also, ability of students in the treatment and control cohorts were very similar (no underlying changes in production technology).

b. In the paper **"Are Emily and Greg more Employable than Lakisha and Jamal" (Bertrand and Mullianathan)** using a couple of sentences/bullet points explain how is discriminatory preferences of HR people measured, why is this a valid experiment and one serious limitation of the analysis.

- Discriminatory preferences are measured based on the callback rates of resumes belonging to white and black applicants. If the call back rates were higher for whites compared to black, in this experiment that will reflect the prejudice of human resources people
- This is a valid experiment because the resumes were sent at random of similar candidates; only the names were either white or black sounding.
- The call back rates may reflect the heterogeneities of competency of HR people rather than their prejudice.

c. In the **"Domestic Violence and NFL Games" (Dahl & Card)** paper using a couple of sentences/bullet points explain what is the causal link between NFL games and domestic violence & write one serious limitation of this paper which will bring down the causality of the story. Also point out one policy implication of this paper.

- The causal link comes from an upset loss creating a negative emotional cue, which results in an altercation getting worse and eventually resulting in domestic violence.
- The trends in domestic violence in absence of home games is not well controlled for. Chances are a city which got domestic violence calls before still will get higher domestic violence calls when home game upset losses occur. So this association may not be causal.
- Policy Implication: Advertisements against domestic violence during NFL games to create more awareness