Results

$$s_T = \frac{\mu\phi}{\mu\phi + \frac{\beta}{\sigma} - \eta} \qquad s_i = \frac{\mu\phi}{\mu\phi + 1 - \eta}$$

$$e_T = \tau_T \cdot \frac{\beta}{\sigma} \cdot \eta^{\frac{1}{1-\eta}} \cdot \left(\frac{2\hat{H}^T}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot \frac{\sum \tau_i^{\frac{\eta}{1-\eta}} \cdot A_i^{\frac{1}{1-\eta}} \cdot s_i^{\frac{\phi}{1-\eta}} \cdot \overbrace{\int a_i^{\frac{\alpha}{1-\eta}} \cdot f^i(a_i)\,da_i}^{f_3}}{\underbrace{\sum \int f^i(a_i)\,da_i}_{f_1}} \cdot \frac{a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}}}{\underbrace{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a_T)\,da_T}_{f_2}}$$

$$e_i = \left(\tau_i \cdot \eta \cdot \left(\frac{2\hat{H}^T}{M}\right)^{\sigma} \cdot s_i^{\phi} \cdot A_i \cdot a_i^{\alpha}\right)^{\frac{1}{1-\eta}}$$

$$H_i' = \left(\tau_i^{\eta} \cdot \eta^{\eta} \cdot \left(\frac{2\hat{H}^T}{M}\right)^{\sigma} \cdot s_i^{\phi} \cdot A_i^{\eta}\right)^{\frac{1}{1-\eta}} \cdot \underbrace{\int a_i^{\frac{\alpha}{1-\eta}} f^i(a_i)\,da_i}_{f_3}$$

$$\hat{H}_T' = \left[\tau_T^{\eta} \cdot \eta^{\frac{\eta}{1-\eta}} \cdot \left(\frac{2\hat{H}^T}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot s_T^{\phi} \cdot \left(\frac{\beta}{\sigma}\right)^{\eta} \cdot \left(\frac{\sum \tau_i^{\frac{\eta}{1-\eta}} \cdot A_i^{\frac{1}{1-\eta}} \cdot s_i^{\frac{\phi}{1-\eta}} \cdot \overbrace{\int a_i^{\frac{\alpha}{1-\eta}} \cdot f^i(a)\,da_i}^{f_3}}{\underbrace{\sum \int f^i(a)\,da_i}_{f_1}}\right)^{\eta} \times \left(\underbrace{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a_T)\,da_T}_{f_2}\right)^{\frac{\sigma-\eta\beta}{\beta}}\right]^{\beta/\sigma}$$

$$\tau = \frac{(1-t)(1-\tau^w)}{(1+\tau e)}$$

$$\omega = \frac{\sum H_i' \cdot A_i'}{\sum \int f^i(a_i)\,da_i} \cdot \frac{(h^T)^{\beta/\sigma}}{\hat{H}_T'} = \eta^{\frac{\eta}{1-\eta}} \cdot \left(\frac{2\hat{H}_T}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot \frac{\sum \tau_i^{\frac{\eta}{1-\eta}} s_i^{\frac{\phi}{1-\eta}} \cdot A_i^{\frac{1}{1-\eta}} \cdot \int a_i^{\frac{\alpha}{1-\eta}} f^i(a_i)\,da_i}{\sum \int f^i(a_i)\,da_i} \cdot \underbrace{\frac{a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}}}{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a)\,da}}_{\text{fraction of students taught.}}$$

$$\hat{H}_T' = \int h^T(a_T)^{\beta/\sigma} \cdot f^T(a_T)\,da_T$$

$$\frac{\alpha\beta}{\sigma-\eta\beta} = \frac{\alpha}{\frac{\sigma}{\beta} - \eta}$$

$$\frac{(h^T)^{\beta/\sigma}}{\hat{H}_T'} = \frac{a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}}}{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a_T)\,da_T}$$

$$h_i = \left(a_i^{\alpha} \cdot s_i^{\phi} \left(\frac{2\hat{H}_T}{M}\right)^{\sigma} \cdot \tau_i^{\eta} \cdot \eta^{\eta} \cdot A_i^{\eta}\right)^{\frac{1}{1-\eta}}$$

$$h_T = \tau_T \cdot \frac{\beta}{\sigma} \cdot \eta^{\frac{1}{1-\eta}} \cdot \left(\frac{2\hat{H}_T}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot \left(\frac{\sum \tau_i^{\frac{\eta}{1-\eta}} A_i^{\frac{1}{1-\eta}} \cdot s_i^{\frac{\phi}{1-\eta}} \cdot \int a_i^{\frac{\alpha}{1-\eta}} f^i(a_i)\,da_i}{\sum \int f^i(a)\,da_i}\right)^{\eta} \cdot \frac{a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}}}{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a_T)\,da_T}$$

$$V_i = \ln(1-s_i) + \mu \ln\left(a_i^{\alpha} \cdot s_i^{\phi} \left(\frac{2\hat{H}_T}{M}\right)^{\sigma} \tau_i \cdot A_i\right)^{\frac{1}{1-\eta}} + \mu \cdot \frac{\eta}{1-\eta} \ln \eta + \mu \ln(1-\eta) + \mu \ln(1+\tau_i^e)$$

$$V_T = \ln(1-s_T) + \mu \ln\left(\tau_T \cdot \left(\frac{2\hat{H}_T}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot (-) \cdot \frac{a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}}}{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a)\,da_T}\right) + \mu \cdot \frac{\eta}{1-\eta} \cdot \ln \eta + \mu \ln\left(1 - \frac{\eta\beta}{\sigma}\right) + \mu \ln(1+\tau_T^e)$$

$V_i = V_T$ Threshold.

$$\frac{a_i^{\frac{\alpha}{1-\eta}}}{a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}}} \cdot \frac{\tau_i^{\frac{1}{1-\eta}}}{\tau_T} \cdot \frac{1-\eta}{1-\frac{\eta\beta}{\sigma}} \cdot \frac{1+\tau^e_i}{1+\tau^e_T} \cdot \left(\frac{1-s_i}{1-s_T}\right)^{1/\mu} = \frac{\sum \tau_i^{\frac{\eta}{1-\eta}} A_i^{\frac{1}{1-\eta}} \cdot s_i^{\frac{\phi}{1-\eta}} \cdot \overbrace{\int a_i^{\frac{\alpha}{1-\eta}} f^i(a)\,da_i}^{f_3}}{s_i^{\frac{\phi}{1-\eta}} \cdot A_i^{\frac{1}{1-\eta}} \underbrace{\sum \int f^i(a_i)\,da_i}_{f_1} \cdot \underbrace{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a)}_{f_2}}$$

Steady state

$$H_T = \left[\tau_T^{\eta} \cdot \eta^{\frac{\eta}{1-\eta}} \cdot \left(\frac{2}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot s_T^{\phi} \left(\frac{\beta}{\sigma}\right)^{\eta} \cdot (-)^{\eta} \cdot \left(\overbrace{\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a_T)\,da_T}^{f_2}\right)^{\frac{\sigma-\eta\beta}{\beta}}\right]^{\frac{\beta}{\sigma} \cdot \frac{1-\eta}{1-\eta-\beta}}$$

$$H_i = \eta^{\frac{2}{1-\eta-\beta}} \cdot \left(\frac{2}{M}\right)^{\frac{\sigma}{1-\eta-\beta}} \cdot \left(\tau_i^{\eta} \cdot s_i^{\phi} \cdot A_i^{\eta}\right)^{\frac{1}{1-\eta}} \underbrace{\int a_i^{\frac{\alpha}{1-\eta}} f^i(a)\,da}_{f_3} \cdot \left[\tau_T^{\eta} \cdot s_T^{\phi} \cdot \left(\frac{\beta}{\sigma}\right)^{\eta} \cdot (-)^{\eta} \cdot \underbrace{\left(\int a_T^{\frac{\alpha\beta}{\sigma-\eta\beta}} f^T(a)\,da\right)^{\frac{\sigma-\eta\beta}{\beta}}}_{f_2}\right]^{\frac{\beta}{1-\eta-\beta}}$$

Part 4: Taxes and Equity

Table 12-17

The following table shows the marginal tax rates for unmarried individuals for two years.

2009		2010	
On Taxable Income...	*The Tax Rate is...*	*On Taxable Income...*	*The Tax Rate is...*
$0 to $15,000	10%	Over $0	20%
$15,000 to $40,000	15%		
$40,000 to $75,000	20%		
$75,000 to $120,000	25%		
Over $120,000	30%		

10. Suppose one goal of the tax system was to achieve vertical equity. While people may disagree about what is "equitable," based on the marginal tax rates given for the two years, which of the following statements is true?
    a. Vertical equity is possible in both years.
    b. Vertical equity is possible in 2009 but not in 2010.
    c. Vertical equity is not possible in 2009 but is possible in 2010.
    d. Vertical equity is not possible in either year.

$$\text{Share } i = \frac{\int \prod_{j \neq i} F\left(\left[\frac{1-\tau_i^w}{1-\tau_j^w} \cdot \left(\frac{1+\tau^{e_i}}{1+\tau^{e_j}}\right)^{-\eta} \cdot \frac{A_i}{A_j}\right]^{1/\alpha} \cdot a_i\right) \cdot f(a_i)\, da_i}{\sum_k \int \prod_{j \neq k} F\left(\left[\frac{1-\tau_k^w}{1-\tau_j^w} \cdot \left(\frac{1+\tau^{e_k}}{1+\tau^{e_j}}\right)^{-\eta} \cdot \frac{A_k}{A_j}\right]^{1/\alpha} \cdot a_k\right) \cdot f(a_i)\, da_i}$$

Remember that it is group specific

mass
$$f^T(a_T) = f(a_T) \cdot \sum_i \left(\int_0^{\bar{a}_i^{-1}(a_T)} \prod_{j \neq i} F\left(\left[\frac{A_i}{A_j} \cdot \frac{1+\tau_i^w}{1-\tau_j^w} \cdot \left(\frac{1+\tau^{e_i}}{1+\tau^{e_j}}\right)^{-\eta}\right]^{1/\alpha} \cdot a_i\right) \cdot f(a_i) \cdot da_i \right)$$

mass
$$f^i(a_i) = f(a_i) \cdot F(\bar{a}_i(a_i)) \cdot \prod_{j \neq i} F\left(\left[\frac{1-\tau^{w_i}}{1-\tau^{w_j}} \cdot \left(\frac{1+\tau^{e_i}}{1+\tau^{e_j}}\right)^{-\eta} \cdot \frac{A_i}{A_j}\right]^{1/\alpha} \cdot a_i\right)$$

$$E_T = \eta^{\frac{\eta}{1-\eta}} \cdot \left(\frac{2\tilde{u}^T}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot \frac{\sum \tau_i^{\frac{\eta}{1-\eta}} \cdot S_i^{\frac{\phi}{1-\eta}} \cdot A_i'^{\frac{1}{1-\eta}} \cdot \int a_i^{\frac{\alpha}{1-\eta}} f^i(a_i)\, da_i}{\sum \int f^i(a_i)\, da_i} = \int w(a_T) f^T(a_T)\, da_T$$

$$E_i = \tau_i^{\frac{\eta}{1-\eta}} \cdot \eta^{\frac{\eta}{1-\eta}} \cdot A_i'^{\frac{1}{1-\eta}} \cdot \left(\frac{2\hat{u}T}{M}\right)^{\frac{\sigma}{1-\eta}} \cdot S_i^{\frac{\phi}{1-\eta}} \cdot \int a_i^{\frac{\alpha}{1-\eta}} f^i(a_i)\, da_i$$