

### 3.3 Poutvaara (2008), Stage 1

$$\text{From stage 4: } z_A \sim \mathcal{U}(0, 1) \quad z_B \sim \mathcal{U}(0, 1) \quad \gamma z_B > z_A \quad \Rightarrow \quad p, w_n, w_m, w_s$$

$$\text{From stage 2: } \max_{e_s} (1 - \tau)(1 - a + e_s)w_s - \frac{1}{2}\beta e_s^2 \quad \Rightarrow \quad e_s$$

$$\text{From stage 2: } \max_{e_i} (1 - p)(1 - \tau)(a + e_i)w_n - p(1 - \tau)(a + e_i)w_m - \frac{1}{2}\beta e_i^2 \quad \Rightarrow \quad e_i$$

$$h_s(a, e_s) = (1 - a) + e_s$$

$$h_i(a, e_i) = a + e_i$$

$$H_s^j(a^j) = \int_0^{a^j} f(a)(1 - a) da + F(a^j)e_s$$

$$H_i^j(a^j) = \int_{a^j}^1 f(a)a da + (1 - F(a^j))e_i$$

$$Y_s^j(a^j) = w_s H_s^j$$

$$Y_i^j(a^j, a^k) = (1 - p)w_n H_i^j + p w_m H_i^k$$

$$\tau_w(Y_s^j + Y_i^j) + \tau_g [Y_s^j + (1 - p)w_n H_i^j + p w_m H_i^j] = c_s F(a^j) + c_i (1 - F(a^j)) + T^j$$

$$\max_{a^A} SWF^A(a^A, a^B, \tau_w, \tau_g) = C_n^A + \alpha C_m^A + (1 - \alpha)C_m^B + T^A - E^A$$

$$\max_{a^A, a^B} SWF^A(a^A, a^B, \tau_w, \tau_g) + SWF^B(a^A, a^B, \tau_w, \tau_g)$$

$$C_n^A(a^A, \tau_w, \tau_g) = (1 - \tau)w_s H_s^A + (1 - p)(1 - \tau)w_n H_i^A$$

$$C_m^A(a^A, \tau_w, \tau_g) = p(1 - \tau)w_m H_i^A$$

$$C_m^B(a^B, \tau_w, \tau_g) = p(1 - \tau)w_m H_i^B$$

$$T^A(a^A, a^B, \tau_w, \tau_g) = \tau_w(Y_s^A + Y_i^A) + \tau_g [Y_s^A + (1 - p)w_n H_i^A + p w_m H_i^A] - c_s F(a^A) + c_i (1 - F(a^A))$$

$$E^A(a^A, \tau_w, \tau_g) = \frac{1}{2}\beta e_s^2 F(a^A) + \frac{1}{2}\beta e_i^2 [1 - F(a^A)]$$

$$\hat{a}^A = \hat{a}^B = \hat{a} = \frac{w_s(1 + e_s) + \frac{1}{2}\beta(e_i^2 - e_s^2) + c_i - c_s + w_s e_i}{(1 - p)w_n + p w_m [\alpha(1 - \tau) + \tau_g] + w_s} - e_i$$

$$a^{A*} = a^{B*} = a^* = \frac{w_s(1 + e_s) + \frac{1}{2}\beta(e_i^2 - e_s^2) + c_i - c_s + w_s e_i}{(1 - p)w_n + p w_m + w_s} - e_i$$

$$\hat{a} > a^*$$

$$\alpha(1 - \tau) + \tau_g < 1$$

$$\alpha(1 - \tau_w - \tau_g) + \tau_g < 1$$