Health and Inequality

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Work in Progress
Introduction
**Motivation**

- Inequality (economic inequality) is one of the themes of our time.
  
  - Large body of literature documenting inequality in labor earnings, income, and wealth across countries and over time
    
    Katz, Murphy (QJE 1992); Krueger et al (RED 2010); Piketty (2014); Kuhn, Ríos-Rull (QR 2016); Khun et al (2017)

- We also know of large socio-economic gradients in health outcomes
  
  - In mortality
    
    Kitagawa, Hauser (1973); Pijoan-Mas, Rios-Rull (Demography 2014); De Nardi et al (ARE 2016);
    
    Chetty et al (JAMA 2016)

  - In many other health outcomes
    
    Marmot et al (L 1991); Smith (JEP 1999); Bohacek, Bueren, Crespo, Mira, Pijoan-Mas (2017)

▷ We want to compare and relate inequality in health outcomes to pure economic inequality.
What we do

- We develop novel ways of measuring
  
  a/ Health-related preferences
  
  b/ Health-improving technology with medical expenditures

- In particular
  
  1. We use consumption growth data to estimate how health affects the marginal utility of consumption
  
  2. We use standard measures of VSL and HRQL to infer how much value individuals place on their life in different health states
  
  3. We use observed medical health spending and people’s valuation of life to infer health technology
THE PROJECT

1. Write a model of consumption, saving and health choices featuring
   (a) Health-related preferences
   (b) Health technology

2. Use the FOC (only) to estimate (a) and (b) with
   • Household level data on consumption growth
   • Household level data on OOP medical spending
   • Household level data on health outcomes
   • Data on VSL and HRQL standard in clinical analysis

3. Use our estimates to
   • Welfare analysis: compare fate of different groups given their allocations
   • Ask what different groups would do if their resources were different and how much does welfare change
   • Evaluate public policies?
Main Challenge

- Theory:
  - Out of Pocket Expenditures Improve Health

- Data:
  - Cross-section: higher spending leads to better health transitions across groups (education, wealth)
  - Panel: higher spending leads to worse outcomes

- Resolution:
  - Unobserved shock to health between $t$ and $t + 1$ shapes
    - the health outlook
    - the returns to investment
  - Higher expenditure signals higher likelihood of bad health shock

▷ Add this feature explicitly into the model
Model
Model
Life-Cycle Model (mostly old-age)

1. Abusing language, Individuals state $\omega \in \Omega \equiv I \times E \times A \times H$ is
   - Age $i \in I \equiv \{50, \ldots , 89\}$
   - Education $e \in E \equiv \{\text{HSD, HSG, CG}\}$
   - Net wealth $a \in A \equiv [0, \infty )$
   - Overall health condition $h \in H \equiv \{h_g, h_b\}$

2. Choices:
   - Consumption $c \in \mathbb{R}_{++} \to$ gives utility
   - Medical spending $x \in \mathbb{R}_+ \to$ affects health transitions
   - Next period wealth $a' \in A$

3. Shocks:
   - Unobserved health outlook shock $\eta$
   - Implementation error $\epsilon$ in health spending

4. (Stochastic) Health technology:
   - Survival given by $\gamma^i(h)$ (note no education of wealth)
   - Health transitions given by $\Gamma^{ei}[h' | h, \eta, x\epsilon]$. (Back to this)
### Uncertainty and Timing of Decisions

1. At beginning of period $t$ individual state is $\omega = (i, e, a, h)$

2. Consumption $c$ choice is made

3. **Health outlook shock** $\eta \in \{\eta_1, \eta_2\}$ with probability $\pi_\eta$
   - Mechanism to obtain health transitions that worsen with valuable medical spending $x$
   - Changes return to health investment and probability of health outcomes

4. Health spending decision $x(\omega, \eta)$ is made

5. **Medical treatment implementation shock** $\log \epsilon \sim N \left(-\frac{1}{2} \sigma_\epsilon^2, \sigma_\epsilon^2 \right)$
   - Mechanism to account for individual variation in health spending
   - Once health spending is made, the shock determines actual treatment obtained $\tilde{x} = x(\omega, \eta) \epsilon$, and also savings $a'(\omega, \eta, \epsilon)$.
   - Allows for the econometric implementation of the Bayesian updating of who gets the bad health outlook shock and who does not.
The Bellman equation

The retiree version

- The household chooses $c, x(\eta), y(\eta)$ such that

$$v^{ei}(h, a) = \max_{c, x(\eta), a'(\eta, \epsilon)} \left\{ u^i(c, h) + \beta^e \gamma^i(h) \sum_{h', \eta} \pi_{\eta}^{ih} \int_{\epsilon} \Gamma^{ei}[h' | h, \eta, x(\eta)\epsilon] v^{e,i+1}[h', a'(\eta, \epsilon)] f(d\epsilon) \right\}$$

- S.T. the budget constraint and the law of motion for cash in hand

$$c + x(\eta) + y(\eta) = a$$

$$a'(\eta, \epsilon) = [y(\eta) - (\epsilon - 1)x(\eta)]R + w^e$$

- The FOC give:
  - One Euler equation for consumption $c$
  - One Euler equation for health investments at each state $\eta$
FOC for consumption

- Optimal choice of consumption for individuals of type $\omega$

$$u_i^c[h, c(\omega)] = \beta^e R \gamma^i(h)$$

$$\sum_{h', \eta} \pi^{ih}_{\eta} \int \Gamma^{ei}[h' \mid h, \eta, x(\omega, \eta)\epsilon] \ u_i^{i+1}[h', c(\omega, \eta, h', \epsilon)] f(d\epsilon)$$

- Standard Euler equation for consumption w/ sophisticated expectation
  (Over survival, health tomorrow $h'$, outlook shock $\eta$, and implementation shock $\epsilon$)

- Note that our timing assumptions Consumption is independent of shocks.

- Then, it is easy to estimate w/o other parts of the model: expected transitions are the same for all individuals of same type $\omega$
FOC for Health Spending

- Individuals of type $\omega$ make different health spending choices $x(\omega, \eta)$ depending on their realized $\eta$

- The FOC for individual of type $\omega$ is $\eta$-specific:

$$R \sum_{h'} \int_{\epsilon} \epsilon \Gamma^{ei}[h' \mid h, \eta, x(\omega, \eta)\epsilon] u^{i+1}[h', c(\omega, \eta, h', \epsilon)] f(d\epsilon) =$$

Expected utility cost of forgone consumption

$$\sum_{h'} \int_{\epsilon} \epsilon \Gamma^{ei}[h' \mid h, \eta, x(\omega, \eta)\epsilon] \text{improvement in health transition} v^{e,i+1}\{h', a'(\omega, \eta, \epsilon)\} f(d\epsilon)$$

- In order to use this for estimation we need to
  - Allocate individuals to some realization for $\eta$
  - Compute the value function
The value functions

- The value achieved by an individual of type $\omega$ is given by

$$
\nu^{ei}(h, a) = u^i(c(\omega), h) 
+ \beta^e \gamma^i(h) \sum_{h', \eta} \pi_{\eta}^{ih} \int_{\epsilon} \Gamma^{ei}[h'|h, \eta, x(\omega, \eta) \epsilon] \nu^{ei+1}(h', a'(\omega, \eta, \epsilon)) f^x(d\epsilon)
$$

with

$$
a'(\omega, \eta, \epsilon) = (a - c(\omega) - \epsilon(\omega, \eta))(1 + r) + w^e
$$

- We can compute the value function from observed choices without solving for the whole model by rewriting the value function in terms of wealth percentiles $p \in P$:

$$
\nu^{ei}(h, p) = \frac{1}{N_{\omega}} \sum_j I_{\omega_j = \omega} u^i(c_j, h_j) + \beta^e \tilde{\gamma}^i_h \sum \tilde{\Gamma}[h', p'|\omega] \nu^{ei+1}(h', p')
$$

where we have replaced the expectation over $\eta$ and $\epsilon$ by the joint transition probability of assets and health, $\tilde{\Gamma}[h', p'|\omega]$.
Estimation
We group wealth data $a_j$ into quintiles $p_j \in P \equiv \{p_1, \ldots, p_5\}$.

State space is the countable set $\hat{\Omega} \equiv E \times I \times H \times P$.

Functional forms

- Utility function
  \[ u^i(h, c) = \alpha_h + \chi^i_h \frac{c^{1-\sigma_c}}{1-\sigma_c} \]

- Health transitions
  \[ \Gamma^{ie}(g|h, \eta, x) = \lambda^{ieh}_0 \eta + \lambda^h_1 \eta x^{1-\nu^h} \]

Estimate several transitions in HRS data

- Survival rates $\tilde{\gamma}^i_h$
- Health transitions $\tilde{\Gamma}(h_g|\omega)$
- Health transitions conditional on health spending $\tilde{\varphi}(h_g|\omega, \tilde{x})$
- Joint health and wealth transitions $\tilde{\Gamma}(h', p'|\omega)$
• Estimate vector of parameters $\theta$ by GMM without solving the model
  → Use the restrictions imposed by the FOC
  → Need to compute value functions with observed choices
• Two types of parameters
  1/ Preferences: $\theta_1 = \{\beta^e, \sigma_c, \chi^i_h, \alpha_h\}$
    • Can be estimated independently from other parameters
    • Use consumption Euler equation to obtain $\beta^e, \sigma_c, \chi^i_h$
    • Use VSL and HRQL conditions to estimate $\alpha_h$
  2/ Health technology: $\theta_2 = \{\lambda^{ih}_0, \lambda^{ih}_1, \nu^h, \pi_7, \sigma^2_\epsilon\}$
    • Requires $\theta_1 = \{\beta^e, \sigma_c, \chi^i_h, \alpha_h\}$ as input
    • Use medical spending Euler equations plus health transitions
    • Problem: we observe neither $\eta_j$ nor $\epsilon_j$
    • Need to recover posterior probability of $\eta_j$ from observed health spending $\tilde{x}_j$
Data
**Various Sources**

1. HRS
   - White males aged 50-88
   - Health stock measured by **self-rated health** (2 states)
   - Obtain the objects $\tilde{\gamma}_h^i$, $\tilde{\Gamma} (h_g | \omega)$, $\tilde{\varphi} (h_g | \omega, \tilde{x})$, $\tilde{\Gamma} (h', p' | \omega)$

2. PSID (1999+) gives
   - Households headed by white males aged 50-88
   - We observe individual type $\omega_j$
   - Non-durable consumption
   - Out of Pocket medical expenditures

3. Standard data in clinical analysis
   - Outside estimates of the value of a statistical life (VSL)
   - Health Related Quality of Life (HRQL) scoring data from HRS
Preliminary Estimates:
Preferences
Marginal utility of consumption

Consumption Euler equation

- We use the sample average for all individuals $j$ of the same type $\omega$ as a proxy for the expectation over $\eta$, $h'$, and $\epsilon$

$$\beta^e R \tilde{\gamma}_h^i \frac{1}{N_\omega} \sum_j I_{\omega_j = \omega} \frac{\chi_{h'j}^{i+1}}{\chi_h^i} \left( \frac{c_j'}{c_j} \right)^{-\sigma} = 1 \quad \forall \omega \in \tilde{\Omega}$$

- Normalize $\chi_g^i = 1$ and parameterize $\chi_b^i = \chi_b^0 (1 + \chi_b^1)^{(i-50)}$

- Use cons growth from PSID by educ, health, wealth quintiles

- We obtain
  1. Health and consumption are complements Finkelstein, Luttmer, Notowidigdo (JEEA 2012), Koijen, Van Nieuwerburgh, Yogo (JF 2016)
  2. More so for older people
  3. Uneducated are NOT more impatient: they have worse health outlook
# Marginal utility of consumption

## Results

Men sample (with $r = 4.04\%$)

<table>
<thead>
<tr>
<th></th>
<th>$\beta$ edu specific</th>
<th>$\beta$ common</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sigma$</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>$\beta^d$</td>
<td>(s.e.) 0.8861 (0.0175)</td>
<td>0.8720 (0.0064)</td>
</tr>
<tr>
<td>$\beta^h$</td>
<td>(s.e.) 0.8755 (0.0092)</td>
<td>0.8720 (0.0064)</td>
</tr>
<tr>
<td>$\beta^c$</td>
<td>(s.e.) 0.8634 (0.0100)</td>
<td>0.8720 (0.0064)</td>
</tr>
<tr>
<td>$\chi^0_b$</td>
<td>(s.e.) 0.9211 (0.0575)</td>
<td>0.9176 (0.0570)</td>
</tr>
<tr>
<td>$\chi^1_b$</td>
<td>(s.e.) -0.0078 (0.0035)</td>
<td>-0.0073 (0.0035)</td>
</tr>
</tbody>
</table>

Observations: 15,432

Moment conditions: 240

Parameters: 5

Notes: estimation with biennial data. Annual interest rate of 2%, annual $\beta$: 0.9413, 0.9357, 0.9292 in first column and 0.9338 in the second one.
Marginal utility of consumption

Results

![Graph showing the marginal utility of consumption over age with lines for $\chi_g$, $\chi_b$, and $\chi_b$ (common $\beta$)]
Value of Life in Good and Bad Health

We use standard measures in clinical analysis to obtain $\alpha_g$ and $\alpha_b$

1. Value of Statistical Life (VSL)
   - From wage compensation of risky jobs Viscusi, Aldy (2003)
   - Range of numbers: $4.0M–$7.5M to save one statistical life
   - This translates into $100,000 per year of life saved
   - Calibrate the model to deliver same MRS between survival probability & cons flow Becker, Philipson, Soares (AER 2005); Jones, Klenow (AER 2016)

2. Quality Adjusted Life Years (QALY)
   - Trade-off between years of life under different health conditions
   - From patient/individual/household surveys: no revealed preference
   - Use HUI3 data from a subsample of 1,156 respondents in 2000 HRS
   - Average score for $h = h_g$ is 0.85 and for $h = h_b$ is 0.60
   - Calibrate the model to deliver same relative valuation of period utilities in good and bad health

- Trade-off between years of life under different health conditions
- From patient/individual/household surveys: no revealed preference

It measures quality of Vision, Hearing, Speech, Ambulation, Dexterity, Emotion, Cognition, Pain up to 6 levels

It aggregates them into utility values to compare years of life under different health conditions

- Score of 1 reflects perfect health, score of 0 reflects dead
- A score of 0.75 means that a person values 4 years under his current health equal to 3 years in perfect health
Preliminary Estimates: health technology
The moment conditions: Preview

- We have
  - $e$: 3 edu groups = \{HSD, HSG, CG\}
  - $i$: 8 age groups = \{50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85-89\}
  - $h$: 2 health groups = \{h_g, h_b\}
  - $p$: 5 wealth groups
  - This gives 240 cells in $\omega$
    - But there are 30 cells that are empty (20 in age 85+, 5 in age 80-84)

- For each $\omega = (i, e, h, p)$, we have four distinct moment conditions.
  - (M1) Health spending EE for $\eta_g$
  - (M2) Health spending EE for $\eta_b$
  - (M3) Average Health transitions for $x > \text{median}(x_\omega)$
  - (M4) Average Health transitions for $x < \text{median}(x_\omega)$

- We have $210 \times 4 = 840$ moment conditions
Key problem: How to deal with unobserved health shock $\eta$

- Needed to evaluate the moment conditions (M1) to (M4)

We construct the posterior probability of $\eta$ given observed health investment $\tilde{x}_j$ and the individual state $\omega_j$

$$Pr [\eta_g | \omega_j, \tilde{x}_j] = \frac{Pr [\tilde{x}_j | \omega_j, \eta_g] Pr [\eta_g | \omega_j]}{Pr [\tilde{x}_j | \omega_j]}$$

- where $Pr [\tilde{x}_j | \omega_j, \eta_g]$ is the density of $\epsilon_j = \tilde{x}_j / x (\omega_j, \eta_g)$
- where $Pr [\eta_g | \omega_j] = \pi_{\eta_g}$
- where $Pr [\tilde{x}_j | \omega_j] = \sum_{\eta} Pr [\tilde{x}_j | \omega_j, \eta] Pr [\eta | \omega_j]$

- We weight every individual observation by this probability
To obtain the posterior distributions we need to estimate

- the contingent health spending rule, \( x(\omega, \eta) \)
- the variance of the medical implementation error, \( \sigma_{\epsilon}^2 \)
- the probability distribution of health outlooks sock, \( \pi_{\eta g}^{ih} \)

We identify all these objects through the observed health transitions \( \tilde{\varphi}(h_g | \omega, \tilde{x}) \) as function of the state \( \omega \) and health spending \( \tilde{x} \)

\[
Pr[h_g | \omega, \tilde{x}] = \Gamma_{ei}^{h} [h_g | h, \eta_g, \tilde{x}] \, Pr[\eta_g | \omega, \tilde{x}] + \Gamma_{ei}^{h} [h_g | h, \eta_b, \tilde{x}] \, (1 - Pr[\eta_g | \omega, \tilde{x}])
\]

observed in the data  | posterior  | posterior
THE PROBLEM

\[ \Gamma(h' \mid h, x, \eta_g) \]

\[ \Gamma(h' \mid h, x, \eta_b) \]

\[ \phi(x) \text{ from data (HRS)} \]

\[ \text{pr}(h' \mid h, x) \]
Moment conditions

Health Spending Euler Equation

- Moment conditions (M1) to (M2) identify the curvature $\nu^h$ and slope $\lambda^h_{1\eta}$ of the health technology

- $\forall \omega \in \tilde{\Omega}$ and $\forall \eta \in \{\eta_g, \eta_b\}$ we have

$$R \frac{1}{M_{\omega\eta}} \sum_j 1_{\omega_j=\omega} \tilde{x}_j \left( \sum_{h'} \Gamma^{e_{ij}} [h' | h_j, \eta, \tilde{x}_j] \chi^{i+1}(h') \left[ c^{e_{ij},i+1}(h', p'_j) \right]^{-\sigma_c} \right) \Pr[\eta|\omega_j, \tilde{x}_j]$$

$$= \frac{1}{M_{\omega\eta}} \sum_j 1_{\omega_j=\omega} \tilde{x}_j \Gamma^{e_{ij}} [h_g | h_j, \eta, \tilde{x}_j] \left[ v^{e_{ij},i+1}(h_g, p'_j) - v^{e_{ij},i+1}(h_b, p'_j) \right] \Pr[\eta|\omega_j, \tilde{x}_j]$$

where $M_{\omega\eta} = \sum_j 1_{\omega_j=\omega} \Pr[\eta|\omega_j, \tilde{x}_j]$

- Note we use $c^{e,i}(h, p)$ (a group average consumption) and $v^{e,i}(h, p)$

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Moment conditions

Average Health Transitions

• Moment conditions (M3) to (M4) identify the $\lambda_{i0}^{ie}$

• $\forall \omega$ and $X \in \{X_{L(\omega)}, X_{H(\omega)}\}$ we have

$$\tilde{\Gamma}(h_g | \omega, X) = \sum_{\eta} \frac{1}{M_{\omega \eta X}} \sum_{j} 1_{\omega_j = \omega, \tilde{x}_j \in X} \left[ \lambda_{0\eta}^{ieh} + \lambda_{1\eta}^{ih} \frac{\tilde{x}_j^{1 - \nu^h} - 1}{1 - \nu^h} \right] \Pr[\eta | \omega_j, \tilde{x}_j]$$

where

• $M_{\omega \eta X} = \sum_{j} 1_{\omega_j = \omega, \tilde{x}_j \in X} \Pr[\eta | \omega_j, \tilde{x}_j]$

• $X_{L(\omega)} = \{x \leq \tilde{x}_{med}(\omega)\}$

• $X_{H(\omega)} = \{x > \tilde{x}_{med}(\omega)\}$
Estimates I

- We parameterize the age-dependence of $\lambda_{0\eta}^{ieh}$ as follows

$$
\lambda_{0\eta}^{ieh} = \frac{\exp(L_{\eta}^{ieh})}{1 + \exp(L_{\eta}^{ieh})}
$$

where $L_{\eta}^{ieh} = a_{\eta}^{eh} + b_{\eta}^{eh} \times (i - 50)$

- We normalize $\pi_{\eta} = 1/2$ and estimate

$$
\theta_2 = \left\{ a_{\eta}^{eh}, b_{\eta}^{eh}, \lambda_{1\eta}^{h}, \nu_{\eta}^{h}, \sigma_{\epsilon}^2 \right\}
$$

(This is 12+12+4+2+1 = 31 parameters)

- They generate health transitions that are consistent with
  - More educated have better transitions
  - Older have worse transitions
  - Useful medical spending predicts worse transitions in the panel

BUT, are good predictors of health transitions in the model.
Health transitions: Wealth Matters in Data not in Model

Data dashed and model dot each wealth quintile
Let’s allow the $\lambda_0$ to depend on wealth

We parameterize the age and wealth dependence of $\lambda_{0\eta}^{iehp}$ as follows:

$$\lambda_{0\eta}^{iehp} = \frac{\exp(L_{\eta}^{iehp})}{1 + \exp(L_{\eta}^{iehp})}$$

where $L_{\eta}^{iehp} = a_{\eta}^{eh} + a_{\eta}^{e\eta} \times (p - 3) + b_{\eta}^{eh} \times (i - 50)$

We normalize $\pi_{\eta} = 1/2$ and estimate

$$\theta_2 = \{a_{\eta}^{eh}, a_{\eta}^{e\eta}, b_{\eta}^{eh}, \lambda_{1\eta}^{h}, \nu^{h}, \sigma_{\epsilon}^{2}\}$$

(This is $12 + 12 + 12 + 4 + 2 + 1 = 43$ parameters)

Now: Wealthier experience better health transitions
PARAMETERS $\nu, \lambda_1$

- If less curvature in health production than in consumption
  - Health expenditure shares would increase with income
  - As in Hall, Jones (QJE 2007) (but completely different identification)
- Bad health outlook shock $\eta_b$ increases return to money (especially so in good health state)

<table>
<thead>
<tr>
<th>parameter</th>
<th>with $\pi = 0.5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\nu(h_g)$</td>
<td>1.2325 (0.022)</td>
</tr>
<tr>
<td>$\nu(h_b)$</td>
<td>0.8204 (0.034)</td>
</tr>
<tr>
<td>$\lambda_1(h_g, \eta_g)$</td>
<td>0.0466 (0.0087)</td>
</tr>
<tr>
<td>$\lambda_1(h_b, \eta_g)$</td>
<td>0.0019 (0.0006)</td>
</tr>
<tr>
<td>$\lambda_1(h_g, \eta_b)$</td>
<td>0.0912 (0.0169)</td>
</tr>
<tr>
<td>$\lambda_1(h_b, \eta_b)$</td>
<td>0.0022 (0.0007)</td>
</tr>
</tbody>
</table>

- Indeed slightly less curvature than utility but not by much
The parameters $\lambda_0$ are identified by the observed average health transitions by type $\omega$ given

- parameters $\lambda_{1\eta}^h$ and $\nu^h$
- observed health spending by types $\omega$

To fit average transitions $\lambda_{0\eta}^{ieh}$ are allowed to vary by age $i$, education $e$, health $h$, and shock $\eta$

However, we also need them to vary by wealth quintile $p$
$\lambda_0(\eta, i, e, h, p)$ GRAPHICALLY

Note: From top to bottom: p1 (blue), p2 (red), p3 (yellow), p4 (purple), p5 (green)
Note: Model (square), HRS (dashed). Note this is the old eq26. Not fitted in this estimation directly.
Two Strategies

1. Pose unobserved types (like education, there is something else that increases wealth AND health)
   - Unfortunately Type composition changes due to health and death pruning (can be controlled for)
   - Bad types dissave (cannot be done without fully solving the model).
     WHICH KILLS THE BEAUTY OF THE APPROACH!!!

2. Assume expenditures are missmeasured and yield different quantities of health investment but in a SYSTEMATIC manner:

\[
\hat{x}^{iehp} = \frac{\sum_p x^{iehp}}{5} + \mu \left( x^{iehp} - \frac{\sum_p x^{iehp}}{5} \right)
\]
Mechanically it comes from the fact that investments are worth less because of shorter residual horizons.

This is evidence perhaps of either

- Cons Role of out-of-pocket medical expenditures increases with age.
- Within the context of our model we can make sense of it as increased gradient of the value of good health.

We have reestimated it with age dependent values of life $\alpha^i_h$ and $\lambda^i_1$ and this seems to solve the issue:

- $\lambda^i_1$ increase some with age
- $\alpha^i_g - \alpha^i_b$ increase some with age
Conclusions
Conclusions

- We have identified Preferences for health
  - Consumption is complement with health
  - Differential value of good health seems to be increasing with age.
  - Health is very valuable.
    - Back of the envelope calculation says that the better health of college educated than high school dropouts is worth 5 times the consumption of the latter group.

- Expenditures matter some but not so much
  - It matters much more if you start in good health
  - Beyond expenditures and Education Wealth Still Matters:
    - Perhaps additional type differences (beyond those that show up in education)
    - Perhaps differential use of Expenditures