The Marriage Market, Labor Supply and Education Choice

Presentation for the Family Inequality Network Workshop

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  - Education subsidies affect education take up, labour but also marital decisions
  - EITC has labour supply effects, and may affect ex-ante education decisions and marital decisions
- We setup a framework for addressing these policy issues by linking education, marital and labour supply decisions
- We will take this framework to the data to quantify the effects and test the model

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- What are the marital returns to education and how relevant are them for education choices?
- How do welfare policies affect intrahousehold allocations, the marriage market and education choices?
- Can welfare policies be targeted to influence child outcomes and tackle inequality?

Model overview

- Three stages in life
  - Education choice
  - Marriage decisions under uncertainty
  - Labour suply and intra-household allocation of consumption to parents and children (public good)

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- Value of marriage: risk sharing and public consumption
- Education has returns in the labour and marriage markets

Related literature

- Collective models of intrahousehold allocation: Chiappori (1988, 1992), Blundell, Chiappori and Meghir (2005), Blundell, Chiappori, Magnac and Meghir (2007), Lise and Seitz (2010)
- Endogenous intrahousehold allocations: Iyigun and Walsh, 2007
- Marital returns to education and education choice: Chiappori, Iyigun and Weiss, 2010, Lafortune, 2011
- Evidence on the impact of targeted interventions on intrahousehold allocations: Duflo, 2003, Attanasio and Lechene, 2010

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  - Full commitment
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  - Assignments are stable: no man or woman would prefer to be in a different match
- Collective model of household decision
  - the sharing rule is determined by the marriage market equilibrium
  - we rule-out divorce at this stage

The model

Third period: preferences in couples

- We adopt a quasi-linear specification with risk aversion that implies transferable utility

$$U_j^C = \frac{1}{\eta+1}\left[c_j(k+1) + \alpha_{Cj}(k+1)(L_j)^{\gamma_{Cj}}\right]^{\eta+1} \qquad \textit{Married}$$

$$U_j^S = \frac{1}{\eta+1}\left[c_j + \alpha_{Sj}(L_j)^{\gamma_{Sj}}\right]^{\eta+1} \quad j = m, f \qquad \textit{Single}$$

- k is the public good, c is private consumption, L is leisure
- Wealth effects on public consumption but not on leisure
- Private and public consumption are complements: dominates some degree of complementarity between leisure and public consumption as L capped

The model

Third period: earnings

- Wages are revealed at this point, not earlier

$$\ln w_m = \ln W_m + \ln H_m(s_m, \theta_m) + \ln(e_m)$$

$$\ln w_f = \ln W_f + \ln H_f(s_f, \theta_f) + \ln(e_f)$$

- Human capital H_j is predetermined, the random shocks e_j finally reveal labour market productivity
- Individuals would want to match on wages but they actually match on human capital H_j

The model

Third period: household problem

- Transferable utility implies that at this stage the Pareto frontier is linear in individual utilities, for all prices and incomes
- Thus determining labour supply and total household consumption is given by the solution to the sum of utilities

$$\max_{c,k,L_m,L_f} \; c(k+1) + \alpha_{Cm}(k+1)(L_m)^{\gamma_{Cm}} + \alpha_{Cf}(k+1)(L_f)^{\gamma_{Cf}}$$

$$s.t. \quad c + P_k k + w_m L_m + w_f L_f = (w_m + w_f)T + y^C$$

where P_k is the price of the public good and y^C represents transfers or unearned income

- Total consumption is $c = c_m + c_f$
- Individual consumptions are determined as a function of labour income and the pre-agreed transfer (full commitment).

The model

Third period: decisions

- Solve explicitly for leisure

$$L_j = \left(\frac{w_j}{\alpha_{Cj} \gamma_{Cj}} \right)^{1/\left(\gamma_{Cj}-1\right)}$$

- And for public consumption

$$k = \frac{y^C + \left(w_m + w_f\right) T + \alpha_{Cm} \left(1 - \gamma_{Cm}\right) \left(L_m\right)^{\gamma_{Cm}} + \alpha_{Cf} \left(1 - \gamma_{Cf}\right) \left(L_f\right)^{\gamma_{Cf}} - P_k}{2 P_k}$$

- Unearned income increases public consumption
- And so do earnings, at least if high enough
- This leads to assortative matching

The model

Third period: decisions

- In marriage, he gets $\rho\left(w_m, w_f\right)$ and she gets $y^C - \rho\left(w_m, w_f\right) - P_k k$
- Realised individual consumptions are

$$c_m = w_m(T - L_m) + \rho\left(w_m, w_f\right)$$

$$c_f = w_f(T - L_f) - \rho\left(w_m, w_f\right) - P_k k + y^C$$

- Contingent transfers under full commitment

The model

Third period: indirect utility

- Indirect utilities are given by

$$V_m^C = \frac{1}{\eta+1}(\rho\,(k+1)+\Theta_m)^{\eta+1}$$

$$V_f^C = \frac{1}{\eta+1}(y^C-\rho\,(k+1)+\Theta_f)^{\eta+1}$$

- where Θ_j is a function of wages for $j = m, f$

The model

Second Period - Sharing rule

- Equilibrium in the marriage market determines the Pareto weight, μ
- Then the sharing rule is the solution to Pareto maximisation problem

$$\max_{\rho} \int \frac{1}{\eta+1}((\rho(k+1)+\Theta_m)^{\eta+1}+\mu(y^C-\rho(k+1)+\Theta_f)^{\eta+1})f(e)de$$

- The solution gives the contingent transfer

$$\rho(w_m, w_f) = \frac{\mu^{\frac{1}{\eta}}(y^C+\Theta_f)-\Theta_m}{\left(1+\mu^{\frac{1}{\eta}}\right)(k+1)}$$

where μ is a function of (H_m, H_f)

The model

Second period - matching and the surplus

- The surplus S of marriage can be defined as the sum expected indirect utilites
- Using the surplus we can establish conditions for possitive assortative matching, i.e. $\frac{\partial^2 S}{\partial H_f \partial H_m} > 0$
- Positive assortative matching holds for our specification of preferences

The model

Second Period - Remaining Single

- A proportion of individuals remain single
- This is endogenous and depends on human capital, marriage market conditions and preferences for marriage

$$d_j = 1\left(EV_j^C > EV_j^S + \varepsilon_j\right)$$

where $\left(EV_j^C, EV_j^S\right)$ are the expected indirect utilities of marrying and remaining single

The model

First Period - Education choice

- Given the expected value of marrying and remaining single, we can define the lifetime expected utility as a function of human capital
- Human capital is a function of innate ability and education, $H_j(\theta_j, s_j)$
- Education is endogenously chosen to maximise

$$EV_j(H_j(s,\theta)) = P \times EV_j^C(H_j(s,\theta)) + (1-P) \times EV_j^S(H_j(s,\theta)) - C_s(s)$$

and P is the probability of selecting into marriage

The model

Equilibrium in the marriage market

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- The sharing rule determines the education decision, and thus the distribution of human capital
- It also determines participation in the marriage market
- In turn this determines who marries who, $\phi(H_f)$
- Equilibrium is characterised by the sharing rule that ensures that the two sides of the market have the same size

The model

Solution

- Computationally, this problem amounts to solve a fixed point problem to determine the sharing rule
- However, the problem is not a contraction mapping
- We have computed the solution in a discrete grid in human capital and approximate it parametrically outside the grid
- For the specifications we have worked with, convergence is achieved quickly

Simulations

- Preliminary simulations to demonstrate some properties of the model and illustrate some policy impacts

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- We consider two alternative policy frameworks
  - In the first, there is no unearned income
  - In the second, married couples receive a subsidy equivalent to 40% of the earnings of women in the 1st decile of the earnings distribution (2 monetary units)
- Take given distribution of human capital: not yet solving for the education decision

Simulations

Specifications

- Wages (estimated from the BHPS)

$$\ln w_m = 2.33 + \ln h_m * \ln e_m \qquad \textit{Males}$$

$$\ln w_m = 2.07 + \ln h_m * \ln e_m \qquad \textit{Females}$$

where

$$\ln h_m \sim N(0, 0.20) \qquad \ln e_m \sim N(0, 0.30) \qquad \textit{Males}$$

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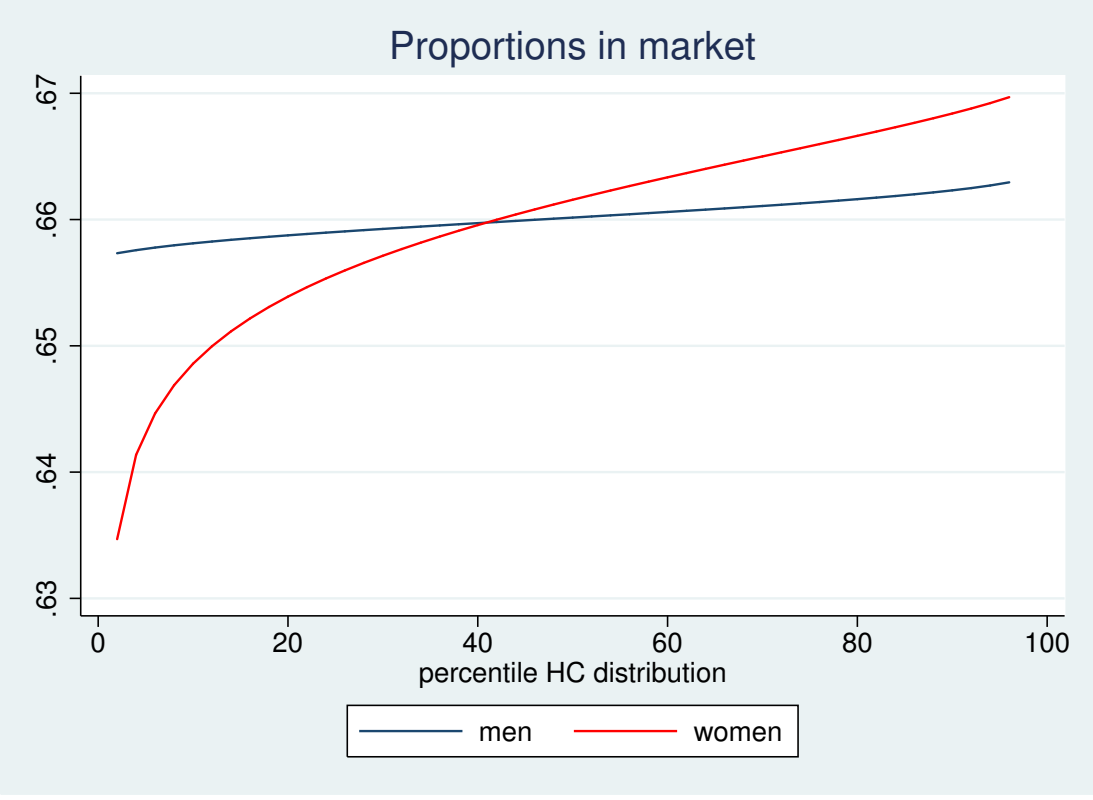
- Mean shock to marriage drawn from extreme value distribution
- Other utility parameters
  - Curvature on leisure: 0.5 to everyone
  - Coefficient on leisure: 2.5 for married women, 1.5 to others
  - Risk aversion coefficien: -1.3

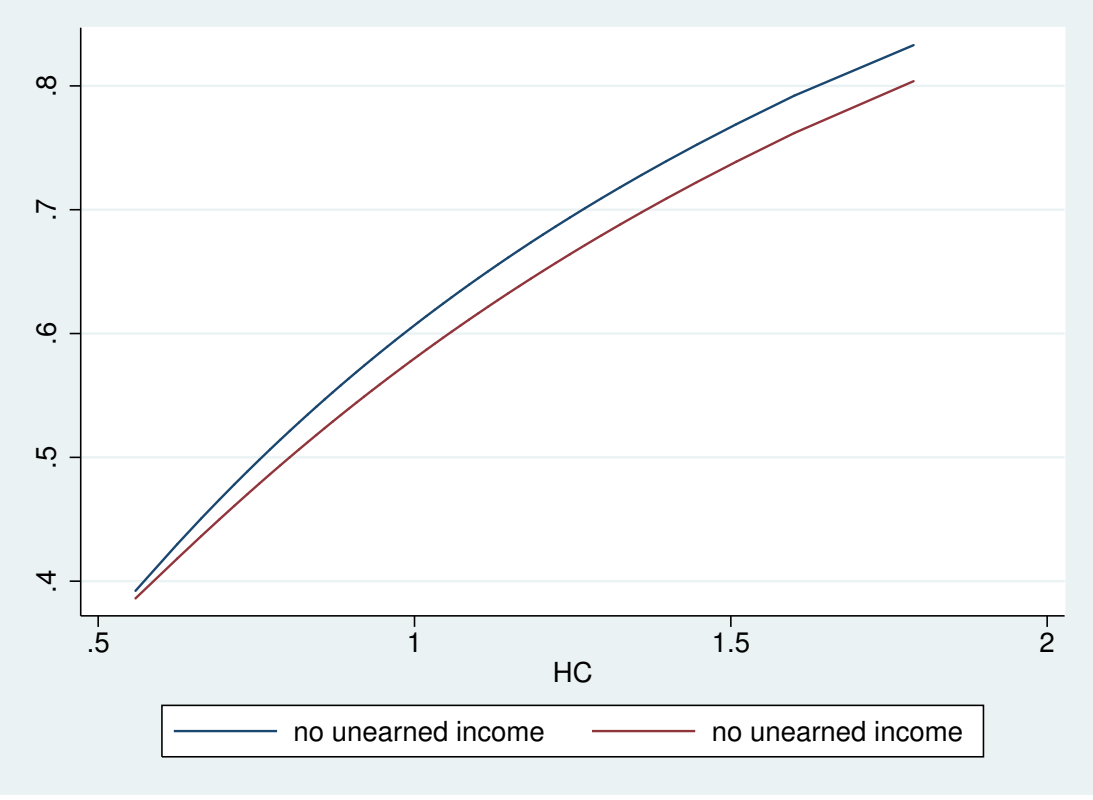
Simulations

Men and women in the marriage market



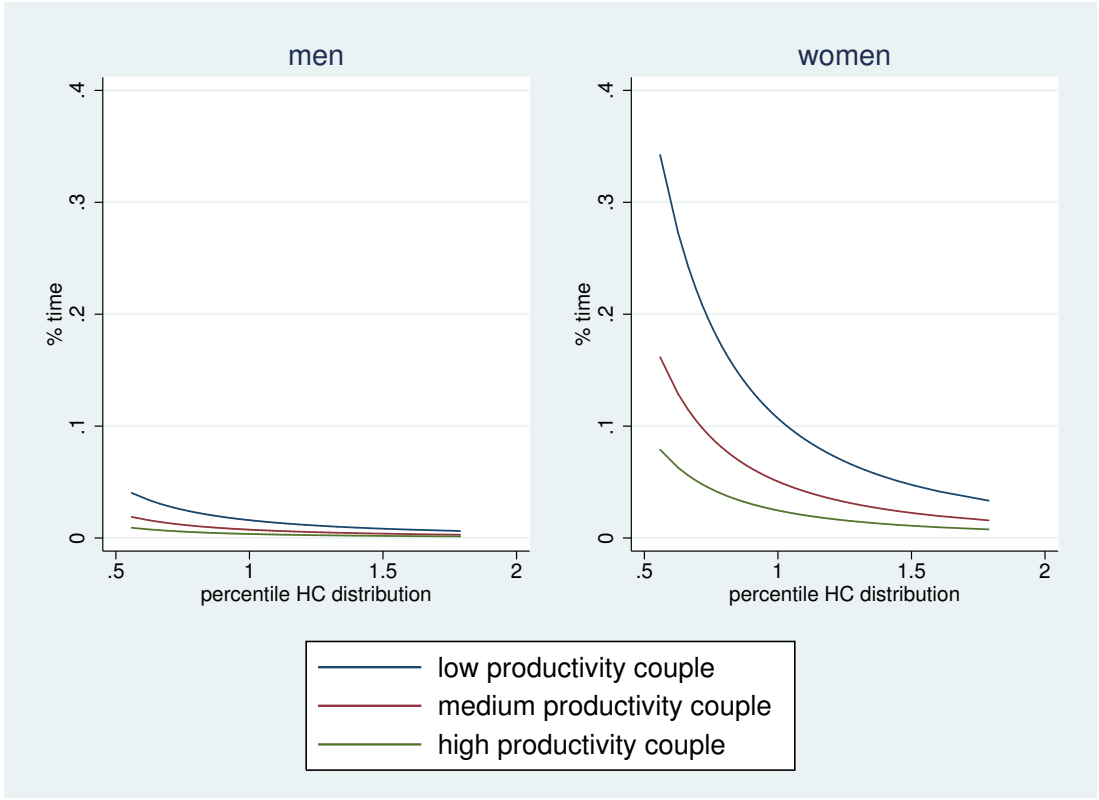
Simulations

Pareto weights



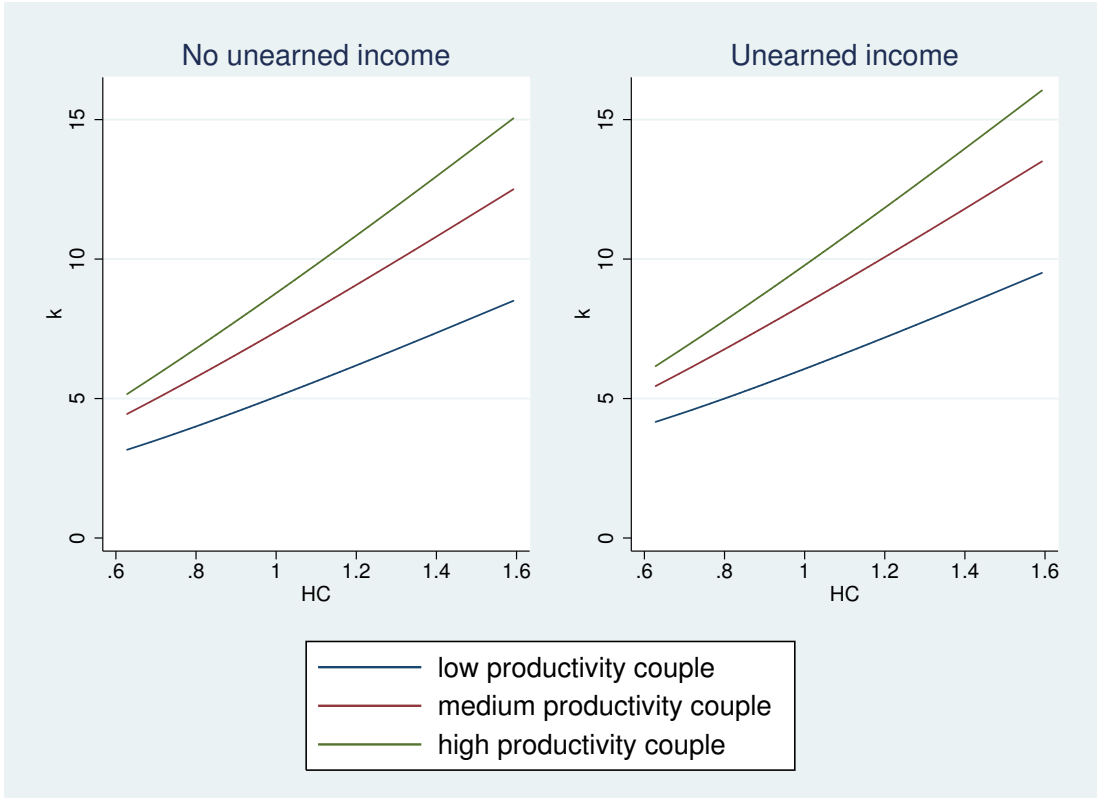
Simulations

Leisure demand



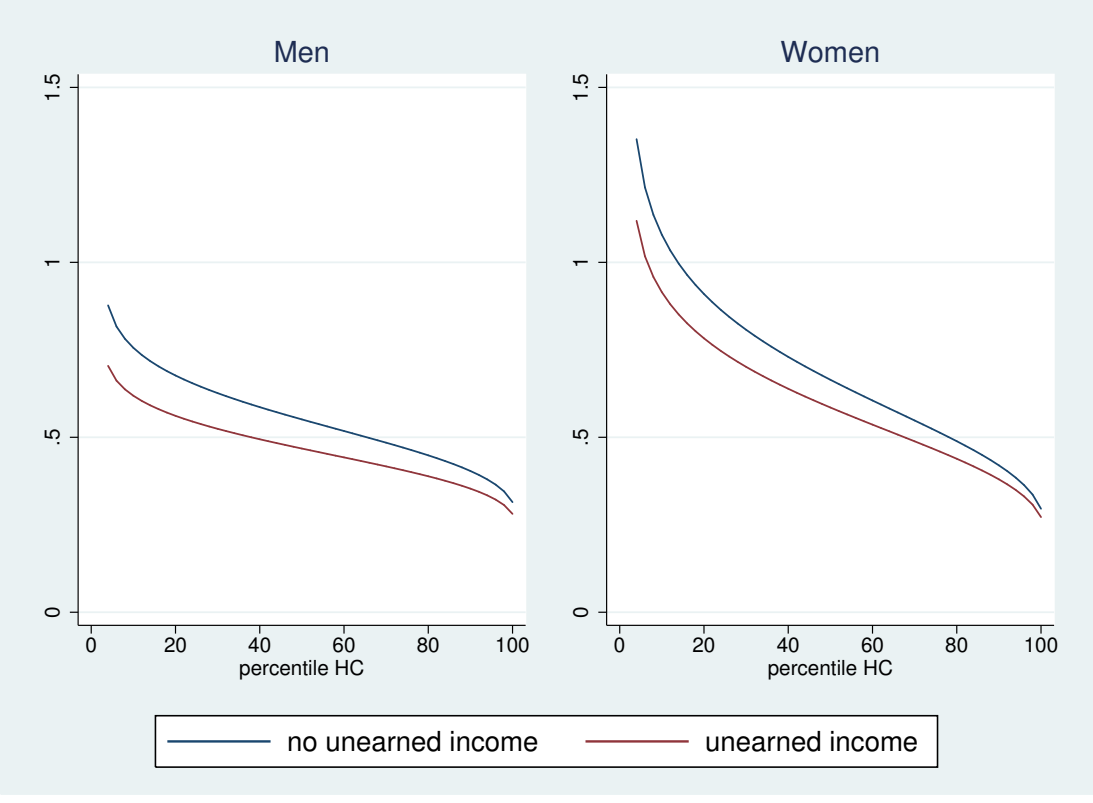
Simulations

Public consumption



Simulations

Gradient of expected value of human capital



Moving forward

- Allow for education decisions
- Take the model to the data by defining the empirical framework more clearly
- Extend model to understand the impact of targeted interventions
- And to allow for divorce (distant future)