The Marriage Market, Labor Supply and Education Choice

Human Capital Formation and Family Economics Workshop

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Columbia University, UCL and IFS, Yale University

Chicago, October 28, 2016
Two fundamental, Beckerian insights:
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- Notion of Human Capital
Human Capital and Matching: a Beckerian Perspective

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  - Matching as an equilibrium phenomenon:
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→ not obvious; depends on the nature of marital gains.
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This paper: investigates this aspect in an explicit, theory-based model
A labor supply perspective

- Standard LS models:
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  - Unitary: one utility, either joint determination of LS or wife’s LS conditional on husband’s

- Collective: joint determination, two utilities plus decision process

- But in both cases: Human capital is exogenous
  - Identity (and HC) of the spouse exogenous

- Here: Recognize endogeneity of both pre-marital HC investment and choice of a spouse

- In fact, intra-household issues crucial to understand pre-marital investments (CIW, AER 2009)

- Crucial importance in analyzing long term consequences of policy reforms: Will they affect matching patterns? Will they affect HC investments?

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Here: we observe:

- Matching patterns...
- ...and behavior (here labor supply)

Basic insight:

- Labor supply behavior provides information on preferences!
- Recover total surplus
- More robust estimates, more general models

This paper: estimation of a matching model of this type
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The framework

Basic features:

- Agents invest in education *before entering the matching game*, based on idiosyncratic ability and cost
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- Efficient risk sharing within the household, efficient labor supply.
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- TU context (despite strictly concave VNM utilities)
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Timing

1. Agents draw their ability, education costs and marital preferences, and invest in education; human capital $H$ depends on ability and education.

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3. Life cycle labor supply $\rightarrow T$ subperiods; at each subperiod:
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   - Wage shocks are realized.
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Life cycle labor supply → $T$ subperiods; at each subperiod:
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Life cycle labor supply $\rightarrow T$ subperiods; at each subperiod:

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3. Life cycle labor supply $\rightarrow T$ subperiods; at each subperiod:
   - Wage shocks are realized
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   - Note that shocks can be permanent ...
   - ... including initial productivity (or HC) shock
Solving the game

Backwards:

- Start with periods 3
Solving the game

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  - Collective, life cycle LS model

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  - Under TU → household utility → standard, unitary model of dynamic labor supply
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- Then period 2:
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  - Observe matching patterns (who marries whom by HC, i.e. education/ability)
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  - → ultimately, *returns to education*
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- Finally period 1: education decisions
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  - → identifies the distribution of education costs
Main problem: stage 1 is a non cooperative game
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- existence may be problematic
Existence and uniqueness

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  - existence may be problematic
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Basic result (Nöldeke Samuelson 2015): consider the following, auxiliary game:

1. Agents draw their ability, education costs and marital preferences; they match on these characteristics, and (jointly) invest in education

2. Life cycle labor supply

This is a standard matching game; existence is guaranteed; generic uniqueness; efficient equilibrium

Crucial result (NS 2015): The stable matching of the auxiliary game can be implemented as a Nash equilibrium of the initial game

Consequences:

- Existence: guaranteed
- Uniqueness: 'generically unique' efficient equilibrium

... but 'coordination failures' are possible

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  - existence may be problematic
  - uniqueness is problematic
- Basic result (Nöldeke Samuelson 2015): consider the following, auxiliary game:
  1. Agents draw their ability, education costs and marital preferences; they match on these characteristics, then (jointly) invest in education
  2. Life cycle labor supply \( T \) subperiods
- This is a standard matching game; existence is guaranteed; ‘generic uniqueness’; efficiency
- Crucial result (NS 2015): The stable matching of the auxiliary game can be implemented as a Nash equilibrium of the initial game
- Consequences:
  - Existence: guaranteed
  - Uniqueness: ‘generically unique’ efficient equilibrium
Existence and uniqueness

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  - uniqueness is problematic

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- Consequences:
  - Existence: guaranteed
  - Uniqueness: ‘generically unique’ efficient equilibrium
  - ... but ‘coordination failures’ are possible
Preferences over private consumption ($C$), public consumption ($Q$), leisure ($L_i$); gender specific

$$u_{it}(Q_t, C_{it}, L_{it}) = \ln (C_{it} Q_t + \alpha_{it} L_{it} Q_t) \text{ under BC}$$

$$Y_t + RS_{t-1} = C_t + S_t + \nu_1 t_1 L_{1t} + \nu_2 t L_{2t} + p Q_t$$
Period 3, subperiod $t$

- Preferences over private consumption ($C$), public consumption ($Q$), leisure ($L_i$); gender specific

$$ u_{it} (Q_t, C_{it}, L_{it}) = \ln (C_{it} Q_t + \alpha_{it} L_{it} Q_t) \text{ under BC} $$

$$ Y_t + RS_{t-1} = C_t + S_t + w_{1t} L_{1t} + w_{2t} L_{2t} + pQ_t $$

- Note: GQL (ordinal) + ISHARA $\Rightarrow$ TU: standard, unitary model at the household level
Period 3, subperiod t

- Preferences over private consumption ($C$), public consumption ($Q$), leisure ($L_i$); gender specific
  \[ u_{it} (Q_t, C_{it}, L_{it}) = \ln (C_{it} Q_t + \alpha_{it} L_{it} Q_t) \]
  under BC
  \[ Y_t + RS_{t-1} = C_t + S_t + w_{1t1} L_{1t} + w_{2t} L_{2t} + pQ_t \]

- Note: GQL (ordinal) + ISHARA $\Rightarrow$ TU: standard, unitary model at the household level

- Labor Supply: discrete; preference shocks on the $\alpha$s
Period 3, subperiod t

- Preferences over private consumption ($C$), public consumption ($Q$), leisure ($L_i$); gender specific
  
  \[ u_{it} (Q_t, C_{it}, L_{it}) = \ln (C_{it} Q_t + \alpha_{it} L_{it} Q_t) \text{ under BC} \]
  
  \[ Y_t + RS_{t-1} = C_t + S_t + \omega_{1t1} L_{1t} + \omega_{2t} L_{2t} + pQ_t \]

- Note: GQL (ordinal) + ISHARA $\Rightarrow$ TU: standard, unitary model at the household level

- Labor Supply: discrete; preference shocks on the $\alpha$s

- Euler equation, solved numerically
Period 3, subperiod \( t \)

- Preferences over private consumption \((C)\), public consumption \((Q)\), leisure \((L_i)\); gender specific

\[
    u_{it} (Q_t, C_{it}, L_{it}) = \ln (C_{it} Q_t + \alpha_{it} L_{it} Q_t) \text{ under BC}
\]

\[
    Y_t + RS_{t-1} = C_t + S_t + \omega_{1t} L_{1t} + \omega_{2t} L_{2t} + pQ_t
\]

- Note: GQL (ordinal) + ISHARA \( \Rightarrow \) TU: standard, unitary model at the household level

- Labor Supply: discrete; preference shocks on the \( \alpha_s \)

- Euler equation, solved numerically

- LS and wage dynamics identify the joint distribution of education and ability
Period 3, subperiod $t$

- Preferences over private consumption ($C$), public consumption ($Q$), leisure ($L_i$); gender specific

$$u_{it} (Q_t, C_{it}, L_{it}) = \ln \left( C_{it} Q_t + \alpha_{it} L_{it} Q_t \right) \text{ under BC}$$

$$Y_t + RS_{t-1} = C_t + S_t + w_{1t} L_{1t} + w_{2t} L_{2t} + pQ_t$$

- Note: GQL (ordinal) + ISHARA $\Rightarrow$ TU: standard, unitary model at the household level
- Labor Supply: discrete; preference shocks on the $\alpha$s
- Euler equation, solved numerically
- LS and wage dynamics identify the joint distribution of education and ability
- Expected value functions at initial date ($t = 1$): $v_i = EV_i$ with

$$e^{v_1} + e^{v_2} = e^{\frac{1-\delta}{1-\delta} Y(H_1, H_2)}$$

$\rightarrow$ therefore TU
Period 2: econometric structure

- Background: Choo-Siow, CSW:

- Woman \(i\) draws a vector of preferences \(\alpha_i = \alpha_{0i}, \alpha_{1i}, \ldots, \alpha_{Ni}\),
- Man \(j\) draws \(\beta_j = \beta_{0j}, \beta_{1j}, \ldots, \beta_{Nj}\).

Surplus derived from the matching of \(i\) with \(j\):

\[ s(i, j) = S(H_i, H_j) + \alpha_j I_i + \beta_I j (\text{plus possibly some deterministic components}) \]

In particular (Graham 2011, 13):
- If supermodularity, AM more frequent than under random matching

Theorem (CSW 2014):
- There exists \(V_1(H_I, H_J)\) and \(V_2(H_I, H_J)\) such that:
  \[ V_1(H_I, H_J) + V_2(H_I, H_J) = S(H_I, H_J) \]

The utility of \(i\) is \(V_1(H_I, H_J) + \alpha_j I_i\),

The utility of \(j\) is \(V_2(H_I, H_J) + \beta_I j\).
Period 2: econometric structure

- **Background:** Choo-Siow, CSW:
  - Finite levels of HC, $H_i, i \in \{1, ..., N\}$

Chiappori, Costa Dias, Meghir (Columbia University, UCL, IFS, Yale University)
Marriage, Labor Supply and Education
Chicago, October 28, 2016 10 / 20
Period 2: econometric structure

- Background: Choo-Siow, CSW:
  - Finite levels of HC, \( H_i, i \in \{1, ..., N\} \)
  - Woman \( i \in I \) draws a vector of preferences \( \alpha_i = (\alpha_i^0, \alpha_i^1, ..., \alpha_i^N) \), man \( j \in J \) draws \( \beta_j = (\beta_j^0, \beta_j^1, ..., \beta_j^N) \)

Surplus derived from the matching of \( i \in I \) with \( j \in J \):
\[
s(i, j) = S(H_I, H_J) + \alpha_J^i + \beta_I^j\]

In particular (Graham 2011, 13): if supermodularity, AM more frequent than under random matching

Theorem (CSW 2014): there exists \( V_1(H_I, H_J) \) and \( V_2(H_I, H_J) \) such that:
\[
V_1(H_I, H_J) + V_2(H_I, H_J) = S(H_I, H_J)
\]

The utility of \( i \) is \( V_1(H_I, H_J) + \alpha_J^i \)
The utility of \( j \) is \( V_2(H_I, H_J) + \beta_I^j \)
Period 2: econometric structure

- Background: Choo-Siow, CSW:
  - Finite levels of HC, $H_i$, $i \in \{1, ..., N\}$
  - Woman $i \in I$ draws a vector of preferences $\alpha_i = (\alpha_i^0, \alpha_i^1, ..., \alpha_i^N)$, man $j \in J$ draws $\beta_j = (\beta_j^0, \beta_j^1, ..., \beta_j^N)$
  - Surplus derived from the matching of $i \in I$ with $j \in J$:
    $$ s(i, j) = S(H_i, H_J) + \alpha_i^j + \beta_j^I $$
    (plus possibly some deterministic components)
Period 2: econometric structure

- **Background:** Choo-Siow, CSW:
  - Finite levels of HC, $H_i$, $i \in \{1, ..., N\}$
  - Woman $i \in I$ draws a vector of preferences $\alpha_i = (\alpha_i^0, \alpha_i^1, ..., \alpha_i^N)$, man $j \in J$ draws $\beta_j = (\beta_j^0, \beta_j^1, ..., \beta_j^N)$
  - Surplus derived from the matching of $i \in I$ with $j \in J$:
    \[ s(i, j) = S(H_i, H_J) + \alpha_i^J + \beta_j^I \]
    (plus possibly some deterministic components)
  - In particular (Graham 2011,13): if supermodularity, AM more frequent than under random matching
Period 2: econometric structure

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  $$V_1(H_i, H_J) + V_2(H_i, H_J) = S(H_i, H_J)$$ and
Period 2: econometric structure

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  - Finite levels of HC, $H_i, i \in \{1, ..., N\}$
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    \[
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    \]
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    \[
    V_1(H_i, H_J) + V_2(H_i, H_J) = S(H_i, H_J)
    \]
    - The utility of $i$ is $V_1(H_i, H_J) + \alpha_i^J$
Period 2: econometric structure

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  - Finite levels of HC, $H_i, i \in \{1, ..., N\}$
  - Woman $i \in I$ draws a vector of preferences $\alpha_i = \left(\alpha_i^0, \alpha_i^1, ..., \alpha_i^N\right)$, man $j \in J$ draws $\beta_j = \left(\beta_j^0, \beta_j^1, ..., \beta_j^N\right)$
  - Surplus derived from the matching of $i \in I$ with $j \in J$:
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  - **Theorem (CSW 2014)**: there exists $V_1(H_i, H_J)$ and $V_2(H_i, H_J)$ such that:
    \[ V_1(H_i, H_J) + V_2(H_i, H_J) = S(H_i, H_J) \]
    The utility of $i$ is $V_1(H_i, H_J) + \alpha_i^J$
    The utility of $j$ is $V_2(H_i, H_J) + \beta_j^I$
Corollary (CSW 2014)

- In the CS context:
In the CS context:

- $i$’s choice solves

$$\max_j V_1(H_I, H_J) + \alpha_i^J$$

Therefore discrete choice models:

- $N_{\text{multilogits}}$ (marital choice of each male/female in class $I/J$)

exactly identified in a highly parametric context (extreme values, no heteroskedasticity)

In our context: same, plus restrictions, since

$$V_1(H_I, H_J) + V_2(H_I, H_J) = S(H_I, H_J)$$

where $S(H_I, H_J)$ can be recovered from labor supply behavior
Corollary (CSW 2014)

- In the CS context:
  - i’s choice solves
    $$\max_{j} V_1 (H_I, H_J) + \alpha_i^j$$
  - j’s choice solves
    $$\max_{j} V_2 (H_I, H_J) + \beta_j^I$$
Corollary (CSW 2014)

- In the CS context:
  - \( i \)'s choice solves
    \[
    \max_j V_1 (H_I, H_J) + \alpha_i^j
    \]
  - \( j \)'s choice solves
    \[
    \max_i V_2 (H_I, H_J) + \beta_j^i
    \]
  - Therefore discrete choice models:
Corollary (CSW 2014)

- In the CS context:
  - $i$’s choice solves
    $$\max_j V_1(H_I, H_J) + \alpha^J_i$$
  - $j$’s choice solves
    $$\max_I V_2(H_I, H_J) + \beta^I_j$$
  - Therefore discrete choice models:
    - $2 \times N$ multilogits (marital choice of each male/female in class $I/J$)
Corollary (CSW 2014)

In the CS context:

- *i*’s choice solves
  \[
  \max_j V_1 (H_I, H_J) + \alpha_i^j
  \]

- *j*’s choice solves
  \[
  \max_I V_2 (H_I, H_J) + \beta_j^I
  \]

Therefore discrete choice models:

- \(2 \times N\) multilogits (marital choice of each male/female in class \(I/J\))
- exactly identified in a highly parametric context (extreme values, no heteroskedasticity)
Corollary (CSW 2014)

- In the CS context:
  - $i$’s choice solves
    \[
    \max_j V_1 (H_I, H_J) + \alpha_i^j
    \]
  - $j$’s choice solves
    \[
    \max_j V_2 (H_I, H_J) + \beta_j^l
    \]
  - Therefore discrete choice models:
    - $2 \times N$ multilogits (marital choice of each male/female in class $I/J$)
    - exactly identified in a highly parametric context (extreme values, no heteroskedasticity)

- In our context: same, plus restrictions, since
  \[
  V_1 (H_I, H_J) + V_2 (H_I, H_J) = S (H_I, H_J)
  \]
  where $S (H_I, H_J)$ can be recovered from labor supply behavior
  $\rightarrow 2 \times N$ multilogits with $N^2$ restrictions on the thresholds.
Impact of policy or other economic changes

Assume changes affect, say, wage dynamics. Impact? → Distinguish ST and LT

- Short term: couples are given; standard impact on:
  - Labor supplies (intensive and extensive margins)
  - Consumption...
  - Including public
- Long term: matching endogenous
  - Changes the respective weight of the deterministic and random parts of the surplus
  - Therefore changes the matching patterns...
  - And the distribution of LS and consumption
- Long long term: returns to education are affected; therefore possible impact on HC acquisition!
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- **Short term**: couples are given; standard impact on:
  - Labor supplies (intensive and extensive margins)
  - Consumptions ...
  - ... including public

- **Long term**: matching endogenous
  - Changes the respective weight of the deterministic and random parts of the surplus
  - Therefore changes the matching patterns ...
  - ... and the distribution of LS and consumption

- ‘**Long long’** term: returns to education are affected; therefore possible impact on HC acquisition!
**Stochastic structure**

- **Wage process**

  \[
  \ln w_{it} = \ln W(\theta_i) + \delta_1 t + \delta_2 t^2 + \delta_3 t^3 + e_{it} + \epsilon_{it}
  \]

  \[
  e_{it} = \rho e_{it-1} + \xi_{it}
  \]

- **Preferences**

  \[
  \alpha_{it} = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \eta_i + u_{it}
  \]
Simulated moments; 3 levels of education, 2 levels of ability $\rightarrow$ 6 levels of HC
Simulated moments; 3 levels of education, 2 levels of ability → 6 levels of HC

Stepwise procedure:
Simulated moments; 3 levels of education, 2 levels of ability $\rightarrow$ 6 levels of HC

Stepwise procedure:

- Wage stochastic process (endogeneous education $\rightarrow$ control function approach).
Estimation

- Simulated moments; 3 levels of education, 2 levels of ability → 6 levels of HC
- Stepwise procedure:
  - Wage stochastic process (endogeneous education → control function approach).
  - Ability and preferences distribution (taking into account endogenous selection into employment)
Simulated moments; 3 levels of education, 2 levels of ability $\rightarrow$ 6 levels of HC

Stepwise procedure:

- Wage stochastic process (endogeneous education $\rightarrow$ control function approach).
- Ability and preferences distribution (taking into account endogenous selection into employment)
- Matching probabilities identify Pareto weights $\rightarrow$ individual benefits of education
Estimation

- Simulated moments; 3 levels of education, 2 levels of ability → 6 levels of HC
- Stepwise procedure:
  - Wage stochastic process (endogeneous education → control function approach).
  - Ability and preferences distribution (taking into account endogenous selection into employment)
  - Matching probabilities identify Pareto weights → individual benefits of education
  - Education choices
Results: surplus

Data: 18 annual waves (1991 to 2008) of the British Household Panel Survey (BHPS)

Table 4: Economic surplus from marriage

<table>
<thead>
<tr>
<th>Men’s educ and ability</th>
<th>Sec (L)</th>
<th>HS (L)</th>
<th>Sec (H)</th>
<th>HS (H)</th>
<th>Univ (L)</th>
<th>Univ (H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec (L)</td>
<td>85.06</td>
<td>148.88</td>
<td>189.26</td>
<td>189.10</td>
<td>197.17</td>
<td>245.39</td>
</tr>
<tr>
<td>HS (L)</td>
<td>82.61</td>
<td>144.33</td>
<td>189.53</td>
<td>185.97</td>
<td>199.87</td>
<td>249.21</td>
</tr>
<tr>
<td>Sec (H)</td>
<td>129.54</td>
<td>210.34</td>
<td>266.84</td>
<td>264.88</td>
<td>299.85</td>
<td>370.86</td>
</tr>
<tr>
<td>Univ (L)</td>
<td>101.45</td>
<td>176.79</td>
<td>241.15</td>
<td>232.27</td>
<td>268.43</td>
<td>338.90</td>
</tr>
<tr>
<td>HS (H)</td>
<td>139.01</td>
<td>220.91</td>
<td>288.21</td>
<td>281.00</td>
<td>326.74</td>
<td>405.43</td>
</tr>
<tr>
<td>Univ (H)</td>
<td>142.96</td>
<td>234.71</td>
<td>317.10</td>
<td>305.31</td>
<td>366.01</td>
<td>460.91</td>
</tr>
</tbody>
</table>

Rows and Columns ordered by male and female human capital respectively. L and H signify low and high ability respectively.

- Supermodular at the top of the distribution ... but not everywhere
## Results: singles

### Table 6: Proportion of singles by level of human capital.

<table>
<thead>
<tr>
<th>Level of Human Capital</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>0.11</td>
<td>0.08</td>
<td>0.14</td>
<td>0.39</td>
<td>0.07</td>
<td>0.21</td>
</tr>
<tr>
<td>Men</td>
<td>0.22</td>
<td>0.31</td>
<td>0.07</td>
<td>0.20</td>
<td>0.16</td>
<td>0.04</td>
</tr>
</tbody>
</table>

## Table 5: Marital Matching patterns

<table>
<thead>
<tr>
<th>Men’s educ</th>
<th>Women’s education</th>
<th>Simulated Proportions</th>
<th>Data Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Men’s choices</td>
<td></td>
</tr>
<tr>
<td>Sec</td>
<td>0.326</td>
<td>0.068</td>
<td>0.001</td>
</tr>
<tr>
<td>HS</td>
<td>0.158</td>
<td>0.124</td>
<td>0.027</td>
</tr>
<tr>
<td>Univ</td>
<td>0.007</td>
<td>0.048</td>
<td>0.049</td>
</tr>
</tbody>
</table>

The numbers represent cell proportions.
Table 8: Sharing rule

<table>
<thead>
<tr>
<th>Men’s educ and ability</th>
<th>Sec (L)</th>
<th>HS (L)</th>
<th>Sec (H)</th>
<th>HS (H)</th>
<th>Univ (L)</th>
<th>Univ (H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec (L)</td>
<td>0.833</td>
<td>0.365</td>
<td>0.523</td>
<td>0.164</td>
<td>0.248</td>
<td>0.163</td>
</tr>
<tr>
<td></td>
<td>(0.261)</td>
<td>(0.114)</td>
<td>(0.148)</td>
<td>(0.080)</td>
<td>(0.073)</td>
<td>(0.040)</td>
</tr>
<tr>
<td>HS (L)</td>
<td>0.931</td>
<td>0.606</td>
<td>0.604</td>
<td>0.377</td>
<td>0.054</td>
<td>0.042</td>
</tr>
<tr>
<td></td>
<td>(0.335)</td>
<td>(0.254)</td>
<td>(0.212)</td>
<td>(0.152)</td>
<td>(0.024)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Sec (H)</td>
<td>0.611</td>
<td>0.455</td>
<td>0.452</td>
<td>0.293</td>
<td>0.072</td>
<td>0.087</td>
</tr>
<tr>
<td></td>
<td>(0.225)</td>
<td>(0.172)</td>
<td>(0.155)</td>
<td>(0.127)</td>
<td>(0.047)</td>
<td>(0.052)</td>
</tr>
<tr>
<td>Univ (L)</td>
<td>0.937</td>
<td>0.856</td>
<td>0.943</td>
<td>0.663</td>
<td>0.440</td>
<td>0.356</td>
</tr>
<tr>
<td></td>
<td>(0.330)</td>
<td>(0.343)</td>
<td>(0.335)</td>
<td>(0.231)</td>
<td>(0.165)</td>
<td>(0.110)</td>
</tr>
<tr>
<td>HS (H)</td>
<td>0.768</td>
<td>0.495</td>
<td>0.583</td>
<td>0.363</td>
<td>0.226</td>
<td>0.199</td>
</tr>
<tr>
<td></td>
<td>(0.252)</td>
<td>(0.193)</td>
<td>(0.188)</td>
<td>(0.142)</td>
<td>(0.037)</td>
<td>(0.065)</td>
</tr>
<tr>
<td>Univ (H)</td>
<td>0.695</td>
<td>0.760</td>
<td>0.744</td>
<td>0.617</td>
<td>0.415</td>
<td>0.361</td>
</tr>
<tr>
<td></td>
<td>(0.330)</td>
<td>(0.285)</td>
<td>(0.262)</td>
<td>(0.213)</td>
<td>(0.136)</td>
<td>(0.121)</td>
</tr>
</tbody>
</table>

Notes: Male Share of Surplus. Asymptotic standard errors in parentheses computed using the bootstrap. Ordering of cells by male and female human capital respectively. L and H signify low and high ability respectively.
Simulation: decrease in education costs

Table 9: Education distribution

<table>
<thead>
<tr>
<th></th>
<th>Men baseline</th>
<th>Men low cost Univ</th>
<th>women baseline</th>
<th>women low cost Univ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec</td>
<td>0.450</td>
<td>0.404</td>
<td>0.542</td>
<td>0.490</td>
</tr>
<tr>
<td>HS</td>
<td>0.400</td>
<td>0.368</td>
<td>0.331</td>
<td>0.309</td>
</tr>
<tr>
<td>Univ</td>
<td>0.150</td>
<td>0.227</td>
<td>0.128</td>
<td>0.202</td>
</tr>
</tbody>
</table>

Table 10: Changes in the matching patterns

<table>
<thead>
<tr>
<th>Men's educ and ability</th>
<th>Sec (L)</th>
<th>HS (L)</th>
<th>Sec (H)</th>
<th>HS (H)</th>
<th>Univ (L)</th>
<th>Univ (H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec (L)</td>
<td>-0.21</td>
<td>-0.21</td>
<td>-0.32</td>
<td>-0.13</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td>HS (L)</td>
<td>-0.23</td>
<td>-0.07</td>
<td>-0.30</td>
<td>-0.06</td>
<td>0.13</td>
<td>0.09</td>
</tr>
<tr>
<td>Sec (H)</td>
<td>-0.73</td>
<td>-0.21</td>
<td>-1.10</td>
<td>-0.12</td>
<td>-0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Univ (L)</td>
<td>0.00</td>
<td>0.23</td>
<td>-0.02</td>
<td>0.17</td>
<td>0.16</td>
<td>0.23</td>
</tr>
<tr>
<td>HS (H)</td>
<td>-0.21</td>
<td>-0.41</td>
<td>-0.59</td>
<td>-0.32</td>
<td>0.20</td>
<td>0.27</td>
</tr>
<tr>
<td>Univ (H)</td>
<td>0.00</td>
<td>0.53</td>
<td>0.21</td>
<td>0.33</td>
<td>1.31</td>
<td>1.41</td>
</tr>
</tbody>
</table>

Numbers correspond to changes in the proportion of each cell. Ordering of cells by male and female human capital respectively. L and H signify low and high ability respectively.
Conclusion

- General model:

Chiappori, Costa Dias, Meghir (Columbia University, UCL and IFS, Yale University)
Conclusion

- General model:
  - Joint determination of education, marital patterns and dynamic labor supply
Conclusion

- **General model:**
  - Joint determination of education, marital patterns and dynamic labor supply
  - ‘Tractable general equilibrium’ perspective
Conclusion

- General model:
  - Joint determination of education, marital patterns and dynamic labor supply
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  - In particular, (expected) marital patterns play a key role for education choices

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    - Requires time use data, ...

- Dynamics:
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    - Requires time use data, ...
  - Dynamics:
    - limited commitment
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- Extensions (future research):
  - Nature of the public good: investment in children’s HC
    - Explicit estimation of the production function
    - Requires time use data, ...
  - Dynamics:
    - limited commitment
    - in particular, divorce