Who Marries Whom?
Optimal matching and assortative marriage

Economic Demography
Demog/Econ C175
Prof. Ryan Edwards
April 7, 2020
Agenda

- Schedule
- Learning objectives: past and present
- Markets and marriage
- Household production
- Optimal sorting
- Positive and negative sorting
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Instructor</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>4/6/20</td>
<td>Class 18: Who Marries Whom?</td>
<td>G. Becker (1973)</td>
<td>-</td>
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<tr>
<td></td>
<td></td>
<td>sections 1, 2, 5</td>
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<tr>
<td>4/8/20</td>
<td>Class 19: Economics of Immigration</td>
<td>NAS (1997) chaps 4, 5 [bCourses]</td>
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<tr>
<td>4/10/20</td>
<td>RStudio Lab 9 due on Gradescope before midnight</td>
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<tr>
<td>4/13/20</td>
<td>Class 20: Fiscal Impacts of Immigration</td>
<td>NAS (1997) chap 7 [bCourses]</td>
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<td>NAS (2016) highlights</td>
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<tr>
<td>4/15/20</td>
<td>Class 21: Gains to Migration</td>
<td>Clemens (2011)</td>
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<td>4/16/20</td>
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<td>Todaro (1969)</td>
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<tr>
<td>4/17/20</td>
<td>Immigration sections</td>
<td>Andrea MG</td>
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<tr>
<td>4/24/20</td>
<td>RStudio Lab 11 due on Gradescope before midnight</td>
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<td>4/30/20</td>
<td>Class 25: Microeconomic Models of Mortality</td>
<td>Bhattacharya et al. (2013) [bCourses]</td>
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<tr>
<td>5/1/20</td>
<td>RStudio Lab 13 due on Gradescope before midnight</td>
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<td>(There is no Lab 12)</td>
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<td>5/4/20</td>
<td>RRR Week</td>
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<td>5/8/20</td>
<td>RRR Week</td>
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Remaining course requirements

• Labs 9, 10, 11, 13  
  \textit{(there is no Lab 12)}

• Final exam will be fully electronic, probably on bCourses, probably 100\% multiple choice
  – Timed, with extra time as usual for DSP allowances
  – Open book, open note, open everything
  – On Honor Code that it’s you and you’re working on your own
Learning objectives

• Economics of Fertility
  – Female wages, the Value of Time, the total cost of children
  – Income and substitution effects
  – The quality-quantity tradeoff, which produces *substitution effects on caffeine*, toward education
Learning objectives

• Economics of Marriage and Divorce
  – Classical (Becker) view: gains from specialization, from partnership-specific goods and investments
  – New views
    • Divorce: it’s complicated. Good economists are humble about what we can say because of selection
    • Similarity in tastes and enjoyment of life might be pretty important for understanding marriage
  – Assortative or Assortive Mating: marriage and fertility are choices, and it is interesting to compare how traits typically vary within couples
Why do people *divorce*?

- There must be gains to divorce if people do it, just like our argument about marriage.

- When the future benefits of a divorce minus the cost of divorce exceed the future gains to this marriage, cut it loose!

- The state of the marriage or partnership market that you face once you divorce is a key input; if the prospects of repartnering are poor, you might stay married.

- Sometimes even the best-laid plans can seem inadequate:
  - Careers can develop in unexpected ways or be lost.
  - Psychological changes can create new incompatibilities, maybe consumption complementarities fade away.
  - People may not have been the most honest when they sold themselves!
Is divorce bad? Is marriage good? Should we design policies to increase marriage?

- Stevenson and Wolfers (2007) provide an economist’s perspective: Marriage and divorce are almost never random treatments.

- Many unobservable characteristics determine marriage & divorce.

- Wealthy, happy, healthy people are surely more likely to be married, according to our theories. But this says little about whether marriage is good for the marginal couple.

- “Gardner and Oswald (2006) find that while people are less happy the year that they separate, a year after the divorce they are happier than they were while married.”

- “Dahl (2005) uses variation in state laws restricting the minimum age of marriage to show that those who are prevented from marrying while young are substantially less likely to end up living in poverty later in their lives.”
Assortative mating

Matchmaker, matchmaker,
Make me a match!
Find me a find!
Catch me a catch!
A motivating example: to marry, or not to marry

<table>
<thead>
<tr>
<th></th>
<th>Susanne</th>
<th>Susanne</th>
<th>David</th>
<th>David</th>
</tr>
</thead>
<tbody>
<tr>
<td>(alone)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(with D)</td>
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<td>(with S)</td>
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<tr>
<td>(alone)</td>
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</table>

Production: 10 8 6 2

Does it make sense for Susanne and David to marry?
1. If they each keep what they produce (no trade, bargaining, exchange)
2. If they can bargain (and "sell" their services)
Lessons from example

• For marriage to make sense, no one is worse off
• If trade and bargaining, then arrangement with highest output should be the choice (because spoils can be divided so that both will win)
The household production function

\[ Z_{ij} = h(A_i, A_j) \]  

[Becker writes \( Z() \)]

\[ Z_{ij} = \text{Total household production of person } i \text{ with attribute } A_i \text{ and person } j \text{ with attribute } A_j \]
What is "production"

• Not just food, clothing and $$

• Also happiness, enjoyment of kids, a lot of things that aren’t in GDP

us stress again that the commodity output maximized by all households is not to be identified with national output as usually measured, but includes conversation, the quantity and quality of children, and other outputs that never enter or enter only imperfectly into the usual measures.
Optimal sorting

- Let’s assume full information, no surprises about household production (ha ha sure)
- Match is made if no alternative is better
- A better match occurs when shifting to a different partner gets you a better outcome
NOTE

• This is hard
• Gary Becker was a Nobel Laureate for a reason
• There are many layers of this onion
• There appears to have been an error in the slides from Spring 2019!
• Something this hard WON’T be on the exam
Becker's example

Just have two males and two females.

Payoff matrix $Z$ is

<table>
<thead>
<tr>
<th></th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>M2</td>
<td>9</td>
<td>7</td>
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Who should pair with whom?
Becker's example

Just have two males and two females.

Payoff matrix Z is

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</tr>
</tbody>
</table>

Who should pair with whom?
Becker's example

Just have two males and two females.
Payoff matrix Z is

\[
\begin{array}{c|cc}
  & F1 & F2 \\ \hline 
 M1 & 8 & 4 \\ M2 & 9 & 7 \\
\end{array}
\]

Who should pair with whom?

In the green squares, partners won’t decide to switch

But there’s some major hosing, right?
Becker's example

Just have two males and two females.
Payoff matrix Z is

<table>
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<tr>
<th></th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>3+5</td>
<td>4</td>
</tr>
<tr>
<td>M2</td>
<td>9</td>
<td>5+2</td>
</tr>
</tbody>
</table>

But in the red circles when returns are divvied up M+F as shown,

M2 won’t marry F1 because 9 < 5 + 5
M1 won’t marry F2 because 4 < 3 + 2

Who should pair with whom?
Becker's example

Just have two males and two females.

Payoff matrix $Z$ is

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Who should pair with whom?

Turns out that the red circles also maximize total output.

Becker’s point was that private contracts could get us there.
What drives a good match?

• Let’s think about traits across partners
• Some traits are probably complementary
  – High education: enjoy talking politics and science
  – Low education: don’t enjoy that, enjoy other things
• Some traits are substitutes
Wages?

• Becker argues that wage levels are substitutes!

A negative correlation between $w_m$ and $w_f$ maximizes total output because the gain from the division of labor is maximized. Low-wage $F$ should spend more time in household production than high-wage $F$ because the foregone value of the time of low-wage $F$ is lower; similarly, low-wage $M$ should spend more time in household production than high-wage $M$. By mating low-wage $F$ with high-wage $M$ and low-wage $M$ with high-wage $F$, the cheaper time of both $M$ and $F$ is used more extensively in household production, and the expensive time of both is used more extensively in market production.
The real world

• Our Lab 10 looks at the 2015 ACS

• American Community Survey (ACS), a continuous micro-census of about 1% of the population

• We look just at California

• In lab, you'll also look at same-sex marriages (a few hundred in sample)
Summary

• Households, like whole pop, can have a production function
• "free market" of choosing partners and within household → optimal sorting, which maximizes individual welfare (and aggregate)
• A framework for understanding sorting, but not predictive
Real world example: Edwards and Roff (2010)

Negative Effects of Paternal Age on Children’s Neurocognitive Outcomes Can Be Explained by Maternal Education and Number of Siblings

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Abstract

Background: Recent findings suggest advanced paternal age may be associated with impaired child outcomes, in particular, neurocognitive skills. Such patterns are worrisome given relatively universal trends in advanced countries toward delayed nuptiality and fertility. But nature and nurture are both important for child outcomes, and it is important to control for both when drawing inferences about either pathway.
Biological clock for males?

• Over time and exposure, there can be mutations to sperm

• (Famously, Hugh Hefner was unable to produce children toward the end of his life)

• Sample sizes are small, but there appears to be some evidence that schizophrenia may be associated with older dads
How would you test for this?

• Can you randomly assign older dads to moms and kids?
  • Nope

• What if you just look at kids in kindergarten who have older dads?
  • Why do they have older dads? Is it random?
We found two big reasons

• Kids had older dads in the data because:
  – Kids had many more older siblings
    • What do we suspect about children’s “quality” on average when quantity of children is higher?
  – Moms had less education
    • This could be associated with family size
    • Or it could reflect assortative mating
Omitted variable bias

• Suppose an outcome, like children’s neurocognitive outcomes (Y) is associated with paternal age (X) and mother’s education (Z)

• If you model

\[ Y = a + b X + \epsilon \]

without Z, then your estimate of b will be biased if X and Z are correlated
A very real-world example

• COVID-19 and treatment drugs

• BBC: “Chloroquine, and a related derivative, hydroxychloroquine, have gained attention - despite the World Health Organization (WHO) saying there is no definitive evidence they work.”

• “There are … risks of serious side effects, including renal and liver damage.”
Omitted variable bias

• Suppose an outcome, like surviving COVID-19 (Y) is associated with chloroquine (X) and something else (Z)

• If you model

\[ Y = a + b X + \epsilon \]

without Z, then your estimate of \( b \) will be biased if X and Z are correlated
Randomized controlled trial

• If you randomly select treatment and control groups who are otherwise identical
• And treat the treated with the treatment
• Then the RCT evidence is the difference in outcomes, and that’s pretty legitimate
• But you’d have to deny the treatment to the control group. Nobody’s yet done that much