From Shame to Game in One Hundred Years: An Economic Model of the Rise in Premarital Sex and its De-Stigmatization

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Shame is a disease of the last age; this seemeth to be cured of it.
Marquis of Halifax (1633-1695)

1 Introduction

- The Sexual Revolution
  - 1900, only 6% of women would have engaged in premarital sex
  - Now, 75% have experienced it
Ogburn’s cultural lag hypothesis

- 1968, 15% of women had a permissive attitude toward it (versus 40% experiencing it)
- 1983, 45%, of women had a permissive attitude toward it (versus 73% experiencing it)
Premarital Sex, attitudes and practice
- Cross-Sectional Facts
  
  - Odds of a girl having premarital sex decline with family income.
    
    * 70% in the bottom decile have experienced it
    * 47% in the top decile have experienced it
  
  - Shame associated with an out-of-wedlock birth increases with income
    
    * 68% in the upper quartile would feel “very upset” if they got pregnant
    * 46% in the bottom quartile would feel “very upset” if they got pregnant
Goal

To account for:

- the rise in premarital sex
- its lagged de-stigmization
- cross-sectional observations about sex
- attitudes towards it
- changes in behavior of social institutions, such as church and state.
Ingredients

- *Purposive decision making*
  - weigh the benefits from sex against its cost

- *Out-of-wedlock births are costly*
  - reduces educational and job opportunities
  - hurts mating prospects
  - shame or stigma
• Socialization

  – parents care about their offspring’s wellbeing

  – parents can influence the tastes of their offspring

  – cost in terms of effort to the parent, resources for church and state

  – incentives to socialize depend on the environment
    * varies by socio-economic class
    * societal mobility

  – “(T)he strategy is to change the self and let the new self decide what is right and what is wrong (for example, by imagining what one’s mother would say about a particular action).” Coleman (1990)
• Technological improvement in contraception

  – paradoxical situation

    * efficacy of contraception has increased

    * so has the number of out-of-wedlock births

  – reduces incentives to socialize
Figure 1: Effectiveness in contraception and out-of-wedlock births
2 Economic History

Out-of-wedlock births and general fertility rate
Stigmization of Premarital Sex

- 1602, Lancashire Quarter sessions
  - Unmarried father and mother of a child
  - Publically whipped
  - Sat in stocks still naked from waist up
  - A placard on their heads read “These persons are punished for fornication”
1648, New Haven

- Couple fined for having sex out of marriage

- Judged ordered that the couple “be brought forth to the place of correction that they may be shamed.”

- He stated that premarital sex was “a sin which lays them open to shame and punishment in this court. It is that which the Holy Ghost brands with the name of folly, it is wherein men show their brutishness, therefore as a whip is for the horse and asse, so a rod is for the fool’s back”
• 1700-1785, Essex country, Massachusetts. 53% of all criminal cases.
  – Single men or women either for “fornication”, or married couples who had a child before wedlock

• 1710-1750, New Haven. 69% of all criminal cases were for premarital sex
Cost of Out-of-wedlock birth

1800, France

- Exception that proves the rule
- Civil code of 1804 prohibited questioning about paternity
- All hospitals were ordered to receive abandoned children
A tour
• 1816, Paris
  – 40% of births were out of wedlock
  – 55% of out-of-wedlock births were abandoned
  – 78% of abandoned children would have died

• Why abandon?
  – Earned Fr 250-600 a year
  – Rent, clothing, laundry, heat and light, Fr 300 a year
  – Baby, clothing and wetnursing, Fr 300 a year
Incentives to socialize

Late 1800s, Scotland

- 0.5% of illegitimate births were to the daughters of professional men
  - “Consider of what importance to society the chastity of women is. Upon that all the property in the world depends. We hang a thief for stealing a sheep, but the unchastity of a woman transfers sheep, and farm, and all from the right owner.” Samuel Johnson

- Lowlands had a much higher rate of illegitimacy than did the Highlands
  - Labor was mobile in the Lowlands and easy for unwed mothers to find work
3 The Model

Setup

- Overlapping generations model—youths, young adults, old adults

- Agents born with three characteristics
  - gender: male, \( m \), or female, \( f \)
  - productivity, \( y \in \mathcal{Y} \)

\[ y' \sim P^y(y'|y) \equiv \Pr[\tilde{y}' \leq y'|\tilde{y} = y] \]
- libido, $h$

$$h \sim P^h(h) \equiv \Pr[\tilde{h} \leq h]$$
Youths–female

- $U(c)$, utility from current household consumption, $c$
- $y'$, her productivity level
- $h$, utility from premarital sex
- $s$, level of parental socialization
- $D(s)$, stigma associated with an out-of-wedlock birth
- $\pi$, odds of safe sex—efficacy of contraception

- $I' \in \{0, 1\}$, indicator function denoting out-of-wedlock birth
  - $0 = \text{no birth}$, $1 = \text{birth}$

- $A^{f'}(y', I')$, future expected lifetime utility

- Decision Making

  Premarital sex if and only if

  $$\beta A^{f'}(y', 0) \overset{\text{no sex}}{<} \frac{\text{joy}}{h} + \frac{\text{no owb}}{\pi \beta A^{f'}(y', 0)} + \frac{\text{owb}}{(1 - \pi) [\beta A^{f'}(y', 1) - D(s)]},$$
– threshold level of libido

\[ h^f* = H^f (y', s) \equiv (1 - \pi) \{ D(s) + \beta[A^f'(y', 0) - A^f'(y', 1)] \} \]

expected cost of premarital sex

– odds of engaging in premarital sex

\[ \Sigma (s, y') = 1 - P^h \left( H^f (y', s) \right) \]

odds sex odds no sex
Adulthood–female

- $T(y_f, I)$, tax function on an out-of-wedlock birth
  
  - $0 \leq T(y_f, 1) \leq 1$

- Consumption for young and old couple of type $(y_f, y_m, I)$

  $$c = C^a \left( y_f, y_m, I \right) = \chi \omega \{ [1 - T(y_f, I)]y_f + y_m \},$$

  $$c' = C^o \left( y_f, y_m, I \right) = \chi' \omega \{ [1 - T(y_f, I)]y_f + y_m \}.$$  

- $G(y'_f, y'_m, I')$, utility that parents get from young adult in type-$(y'_f, y'_m, I')$ household.
\begin{itemize}
  \item $P^f \left( y'_m | y'_f, I' \right)$, odds a young type-$(y'_f, I')$ female will match with a type-$y'_m$ male–endogenously determined
  
  \item $V\left( (1 + \iota I) s \right)$, disutility that each parent gets from socializing a pair of twins to level $s$
\end{itemize}
\[ M(y_f, y_m, s, I, y'_f) \), expected utility for a young couple in a marriage of type \((y_f, y_m, s, I, y'_f)\)

\[
M(y_f, y_m, s, I, y'_f) = \\
\frac{U(C^a(y_f, y_m, I))}{\text{cons, young}} + \beta\frac{U(C^o(y_f, y_m, I))}{\text{cons, old}} - \frac{V((1 + \iota I) s)}{\text{cost of socializing}} \\
+ \beta[1 - \Sigma(s, y'_{f})] \int G(y'_f, y'_m, 0) dP^f(y'_m|y'_{f}, 0) \\
+ \beta \pi \Sigma(s, y'_{f}) \int G(y'_f, y'_m, 0) dP^f(y'_m|y'_{f}, 0) \\
+ \beta(1 - \pi) \Sigma(s, y'_{f}) \int G(y'_f, y'_m, 1) dP^f(y'_m|y'_{f}, 1)
\]
• Socialization decision

\[ M^* (y_f, y_m, I, y'_f) \equiv \max_s [M (y_f, y_m, s, I, y'_f)] \]

• Value function for a female youth

  – Doesn’t know her future husband’s type, \( y_m \)

  – Doesn’t know her future daughter’s type, \( y'_f \)

\[ A^f (y_f, I) \equiv \int \int M^* (y_f, y_m, I, y'_f) \frac{dP^f (y_m|y_f, I)}{\text{matching}} \frac{dP^{y'} (y'_f|y_f)}{\text{transmission}} \]
Matching

- \( L(y_f, y_m, I) \), lifetime utility for a type-\((y_f, y_m, I)\) household
  \[
  L(y_f, y_m, I) \equiv \int M^* (y_f, y_m, I, y'_f) dP^y(y'_f|y_f)
  \]

- \( F(y_{f,j}, I) \), stationary distribution for type-\((y_{f,j}, I)\).

- Matching process
  
  - Rank matches from best to worst
    
    * \( L(y_{f,n}, y_{m,n}, 0) > \cdots > L(y_{f,j}, y_{m,k}, I) > \cdots > L(y_{f,1}, y_{m,1}, 1) \)
At each stage, \( l \), the best available males are paired with the best available females

* \( R^l_m(y_{m,k}) \), remaining males of type \( y_{m,k} \)
* \( R^l_f(y_{f,j}, I) \), remaining females of type \( (y_{f,j}, I) \)

* \( \#(y_{f,j}, I) = F(y_{f,j}, I) - F(y_{f,j-1}, I) \),
  - number of females of type \( (y_{f,j}, I) \)

* \( \Pr(y_{m,k} | y_{f,j}, I) = \min\{R^l_m(y_{m,k}), R^l_f(y_{f,j}, I)\} / \#(y_{f,j}, I) \)
  - \( R^{l+1}_m(y_{m,k}) = R^l_m(y_{m,k}) - \min\{R^l_m(y_{m,k}), R^l_f(y_{f,j}, I)\} \), etc

* \( \mu \), fraction of matches done in the above fashion, \( 1 - \mu \) are random
4 Theory

Lemma (Lustful males) More males desire to engage in premarital sex than females

Lemma (Balanced growth) If utility is logarithmic then growth in productivity has no effect on socialization

Lemma (The de-stigmatization of sex) An increase in the current efficacy of contraception, $\pi$, will reduce the current level of socialization, $s$, ceteris paribus

Lemma (A rise and fall in out-of-wedlock births) As the efficacy of contraception increases out-of-wedlock birth will first rise and then eventually fall (with some extra assumptions)
5 Simulation

- **Functional forms**

\[
U(c) = \ln(c), \quad G(y'_f, y'_m, I') = \phi \ln(C^{a'}(y'_f, y'_m, I')) + \phi \ln(\zeta T(y'_m, I')), \\
D(s) = \gamma \frac{s^{1-\delta}}{1-\delta}, \quad V(s(1 + \nu I)) = \theta \ln(t - s(1 + \nu I)),
\]

- **Productivities**

- Three education categories, <HS, HS, C
  - Six types within an category, \(\mathcal{Y} = \{y_1, y_2, \cdots, y_{18}\}\)–Guner, Kaygusuz, and Ventura (2008)
- $P^y (y'_f | y_f)$, is given following simple representation:

$$P^y (y'_f | y_f) \sim \begin{cases} 
  y'_{f,i} = y_{f,i}, & \text{with prob } \rho + (1 - \rho) \Pr(y_{f,i}), \\
  y'_{f,i} = y_{f,j} \text{ (for } i \neq j), & \text{with prob } (1 - \rho) \Pr(y_{f,j}),
\end{cases}$$

where $\rho$ is taken from Knowles (1999)

- **Tax Function on Out-of-Wedlock Births**

$$T(y_{f,i}, 1) = \left\{ \left[ \sum_{j=1}^{i} \lambda \left( \frac{y_{f,j}}{y_{f,18}} \right)^{\alpha} (y_{f,j} - y_{f,j-1}) \right] + \text{constant} \right\} / y_{f,i},$$

for $i = 1, 2, \cdots, 18$

- Characterized by three parameters, constant, $\lambda$, $\alpha$
• **Efficacy of Contraception,** $\pi$

  – Year 2000, annual failure rate was 28%—Greenwood and Guner (2008)

  – Teenagers are exposed about $1/2$ of this time in a year

  \[
  \pi = 1 - \frac{0.28}{2} = 0.86
  \]

• **Targets, for picking** $\{\beta, \phi, \gamma, \delta, \theta, \eta, \zeta, \nu, \tau, \lambda, \alpha\}$

  1. Cross-sectional relationship between a girl’s education and the likelihood that she will have premarital sex

  2. Time that a mother spends with her child, as a function of the mother’s educational background
3. Correlation between a girl’s educational type and her husband’s, conditional on out-of-wedlock birth

<table>
<thead>
<tr>
<th>Female’s history</th>
<th>Data</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without out-of-wedlock birth</td>
<td>0.49</td>
<td>0.47</td>
</tr>
<tr>
<td>With out-of-wedlock birth</td>
<td>0.29</td>
<td>0.32</td>
</tr>
</tbody>
</table>
Figure 2: Cross-sectional relationship between the odds of a girl engaging in premarital sex and her educational background, data and model
Figure 3: Cross-sectional relationship between the time spent with a daughter and the mother’s educational background, data and model.
Figure 4: Implicit tax on an out-of-wedlock birth by education level, model
Figure 5: Cross-sectional relationship between the daughter’s stigma from engaging in premarital sex and her mother’s educational background.
6 Computational Experiment

- Start the world off in a situation where premarital sex is risky
  
  - Annual failure rate for contraception is 63%—Greenwood and Guner (2008)
  
  - Odds of safe sex, $\pi = 1 - 0.63/2 = 68\%$

- Put in historical time path for efficacy of contraception
Figure 6: Sexual revolution
Figure 7: The impact of socialization on premarital sex
Figure 8: Immigration thought experiment—Alessandra
7 The Church and State: An Extension

Illegitimacy costly for the church and state

- Medieval Ages, Manorial Society
  - leyrwyte
    - leger, lying down
    - wyte, fine
  - childwyte, fine for out-of-wedlock birth
• Ireland, 18th century

  – Elizabeth Hayland—a Parish nurse, frequently known as a ‘lifter’
    * rounded up 27 abandoned foundlings in year
    * deposited them in nearby parishes—7 died
    * one returned by the lifter of a nearby parish
Ramsey Problem–Church and State

- \( O(r) \), opprobrium felt by parents if child has out-of-wedlock birth
  - \( r \), activity undertaken by church to generate this stigma

- \( \nu r^{\nu + 1}/(\nu + 1) \), cost of socialization

- Ramsey Problem

\[
\min_r \left\{ \sum_{I=0}^{1} \int \left( 1 - \pi \right) \Sigma(s, y_f') dP^y(y_f'y_f)dF(y_f, I) \right\}
\]

out-of-wedlock births to daughters of type-(\(y_f,I\)) parents

\[
+ \frac{\nu r^{\nu + 1}}{(\nu + 1)}\}
\text{cost}
\]
subject to the parent’s socialization decision rule

\[ s = S(y_f, I; r), \text{ for } I = 0, 1 \]
Socialization by church and parents
8 Conclusions

- Premarital sex was a risky activity in yesteryear
  - Odds of becoming pregnant were high
  - Economic consequences of an out-of-wedlock birth were dire

- Children weighed the costs and benefits of the activity
  - Parents, churches, etc. socialized children to possess a set of sexual mores aimed at stigmatizing sex
  - Parents at the lower end of social economic scale would have less incentive to socialize
• *Technological improvement in contraception*

  – Young adults more likely to participate in sexual activity

  – Reduced the need for socialization by parents and institutions such as churches