# 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)
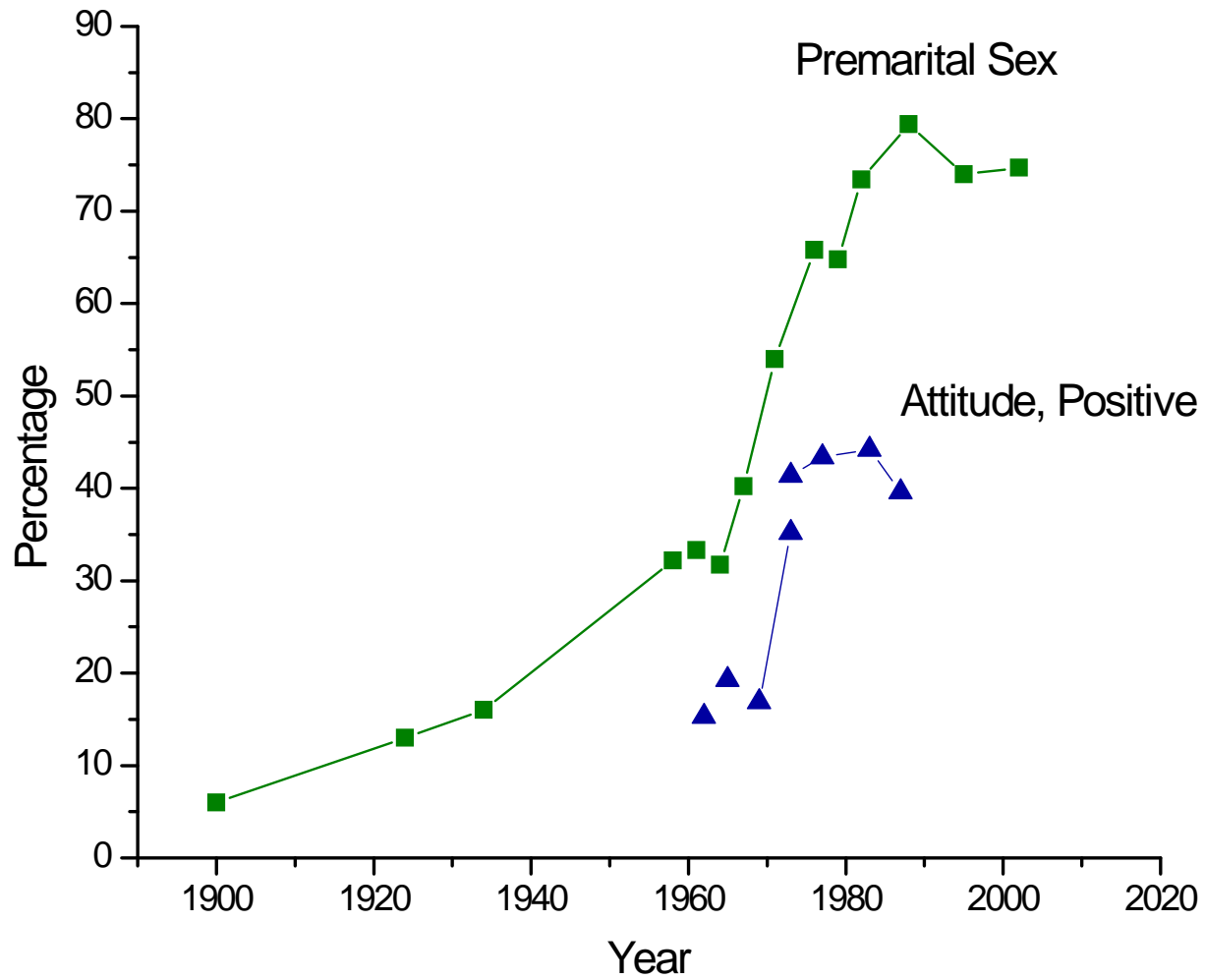
Premarital Sex, attitudes and practice

- *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

  - <u>Shame</u> 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
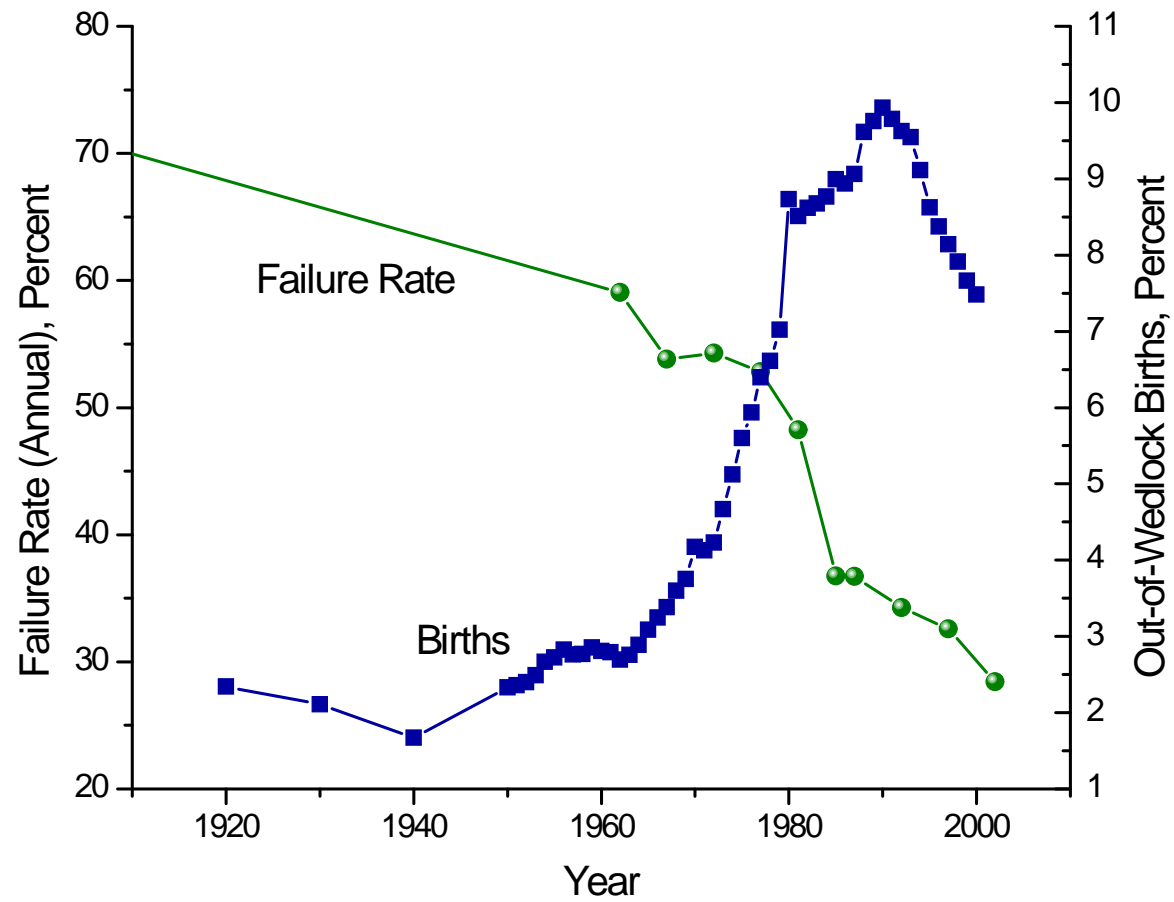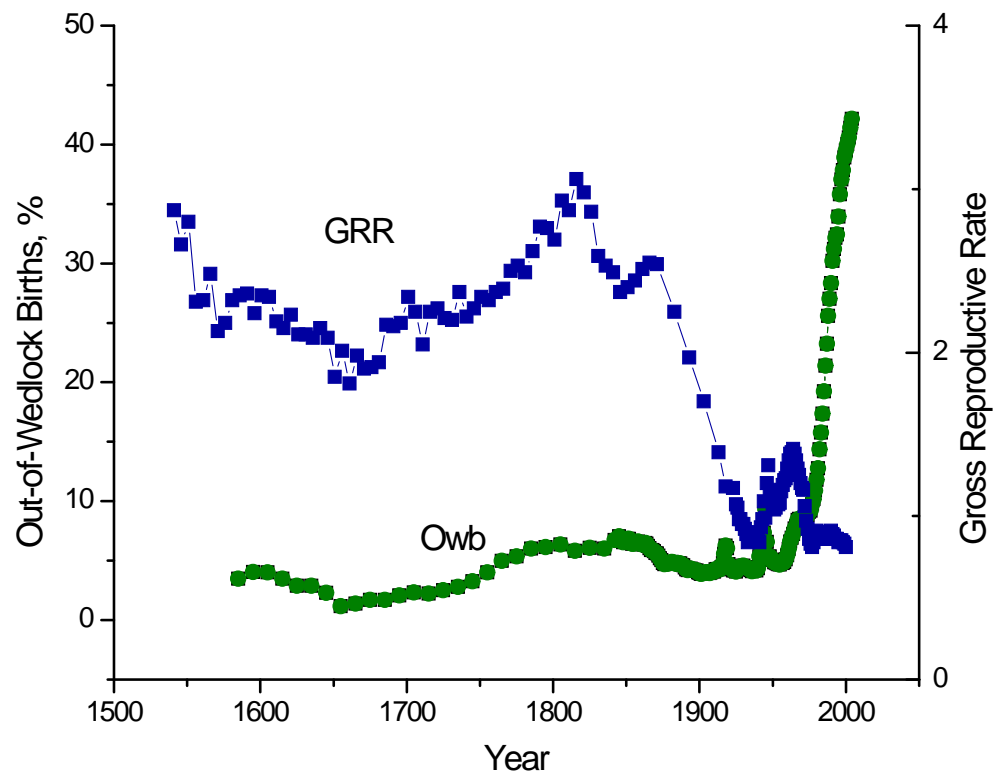
Figure 1: Effectiveness in contraception and out-of-wedlock births

# 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 <u>shamed</u>."

  - He stated that premarital sex was "a sin which lays them open to <u>shame</u> 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
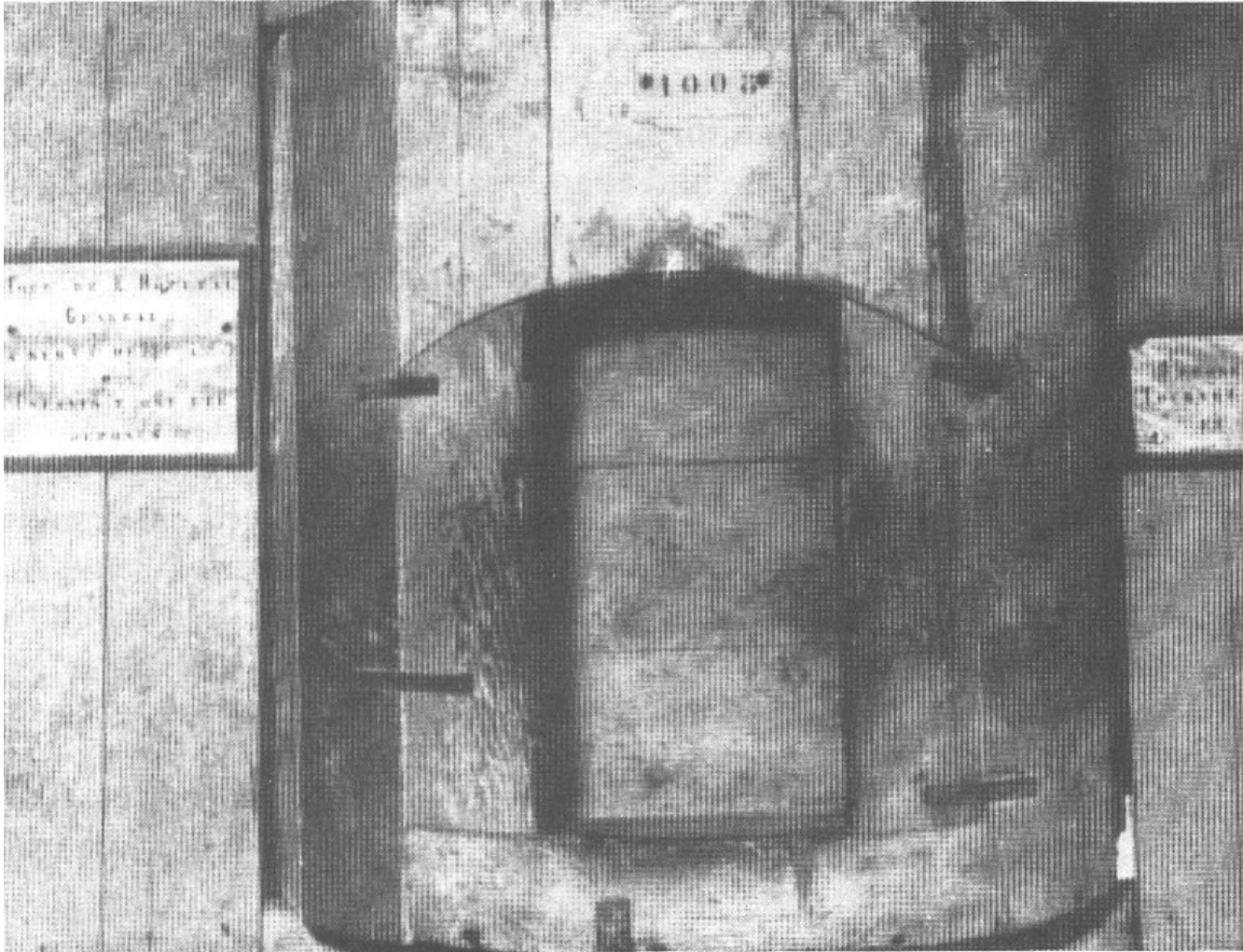
A tour

- 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, $y \in \mathcal{Y}$

  $$y' \sim P^y(y'|y) \equiv \mathsf{Pr}[\tilde{y}' \leq y'|\tilde{y} = y]$$

– libido, $h$

$$h \sim P^h(h) \equiv \mathsf{Pr}[\widetilde{h} \leq h]$$

# 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

  - $0 =$ no birth, $1 =$ birth

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

- Decision Making

  Premarital sex if and only

$$\underbrace{\beta A^{f\prime}\left(y', 0\right)}_{no\ sex} < \overbrace{h}^{joy} + \overbrace{\pi\beta A^{f\prime}(y', 0)}^{no\ owb} + \underbrace{\overbrace{(1-\pi)\left[\beta A^{f\prime}\left(y', 1\right) - D\left(s\right)\right]}^{owb}}_{sex},$$

– threshold level of libido

$$h^{f*} = H^f\left(y', s\right) \equiv \underbrace{(1 - \pi)\left\{D\left(s\right) + \beta[A^{f\prime}\left(y', 0\right) - A^{f\prime}\left(y', 1\right)]\right\}}_{\text{expected cost of premarital sex}}$$

– odds of engaging in premarital sex

$$\underbrace{\Sigma\left(s, y'\right)}_{\text{odds sex}} = 1 - \underbrace{P^h\left(H^f\left(y', s\right)\right)}_{\text{odds no sex}}$$

# 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 $\left(y_f, y_m, I\right)$

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

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

- $G(y'_f, y'_m, I')$, utility that *parents* get from young adult in type-$\left(y'_f, y'_m, I'\right)$ household.

- $P^f\left(y'_m | y'_f, I'\right)$, odds a young type-$(y'_f, I')$ female will match with a type-$y'_m$ male–endogenously determined

- $V((1 + \iota I)\, s)$, disutility that each parent gets from socializing a pair of twins to level $s$

- $M\left(y_f, y_m, s, I, y_f'\right)$, expected utility for a young couple in a marriage of type $\left(y_f, y_m, s, I, y_f'\right)$

$$M\left(y_f, y_m, s, I, y_f'\right) =$$
$$\underbrace{U(C^a\left(y_f, y_m, I\right))}_{\text{cons, young}} + \underbrace{\beta U(C^o\left(y_f, y_m, I\right))}_{\text{cons, old}} - \underbrace{V((1 + \iota I)\, s)}_{\text{cost of socializing}}$$
$$+ \underbrace{\beta[1 - \Sigma\left(s, y_f'\right)] \int G(y_f', y_m', 0) dP^{f\prime}\left(y_m' | y_f', 0\right)}_{\text{no premartial sex, daughter}}$$
$$+ \underbrace{\beta \pi \Sigma\left(s, y_f'\right) \int G(y_f', y_m', 0) dP^{f\prime}\left(y_m' | y_f', 0\right)}_{\text{premarital sex, no out-of-wedlock birth}}$$
$$+ \underbrace{\beta(1 - \pi) \Sigma\left(s, y_f'\right) \int G(y_f', y_m', 1) dP^{f\prime}\left(y_m' | y_f', 1\right)}_{\text{out-of-wedlock birth}}$$

- Socialization decision

$$M^* \left( y_f, y_m, I, y_f' \right) \equiv \max_s [M \left( y_f, y_m, s, I, y_f' \right)]$$

- Value function for a female youth

  – Doesn't know her future husband's type, $y_m$

  – Doesn't know her future daughter's type, $y_f'$

$$A^f \left( y_f, I \right) \equiv \int \int M^* \left( y_f, y_m, I, y_f' \right) \underbrace{dP^f \left( y_m | y_f, I \right)}_{\text{matching}} \underbrace{dP^y(y_f' | y_f)}_{\text{transmission}}$$

# Matching

- $L(y_f, y_m, I)$, lifetime utility for a type-$(y_f, y_m, I)$ household

$$L(y_f, y_m, I) \equiv \int M^* \left( y_f, y_m, I, y_f' \right) dP^y(y_f'|y_f)$$

- $F(y_{f,j}, I)$, 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

    * $R_m^l(y_{m,k})$, remaining males of type $y_{m,k}$

    * $R_f^l(y_{f,j}, I)$, 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 $(y_{f,j}, I)$

    * $\Pr(y_{m,k}|y_{f,j}, I) = \underbrace{\min\{R_m^l(y_{m,k}), R_f^l(y_{f,j}, I)\}}_{\#\text{ matches}}/\underbrace{\#(y_{f,j}, I)}_{\#\text{ females}}$

      · $R_m^{l+1}(y_{m,k}) = R_m^l(y_{m,k}) - \min\{R_m^l(y_{m,k}), R_f^l(y_{f,j}, I)\}$, 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 premartial 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*

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

- *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)

– $P^y\left(y_f'|y_f\right)$, is given following simple representation:

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

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

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

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

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

  $$\pi = 1 - 0.28/2 = 0.86$$

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

  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

| Correlations–Matching by Educ. | | |
|---|---|---|
| | *Data* | *Model* |
| *Female's history* | | |
| Without out-of-wedlock birth | 0.49 | 0.47 |
| With out-of-wedlock birth | 0.29 | 0.32 |
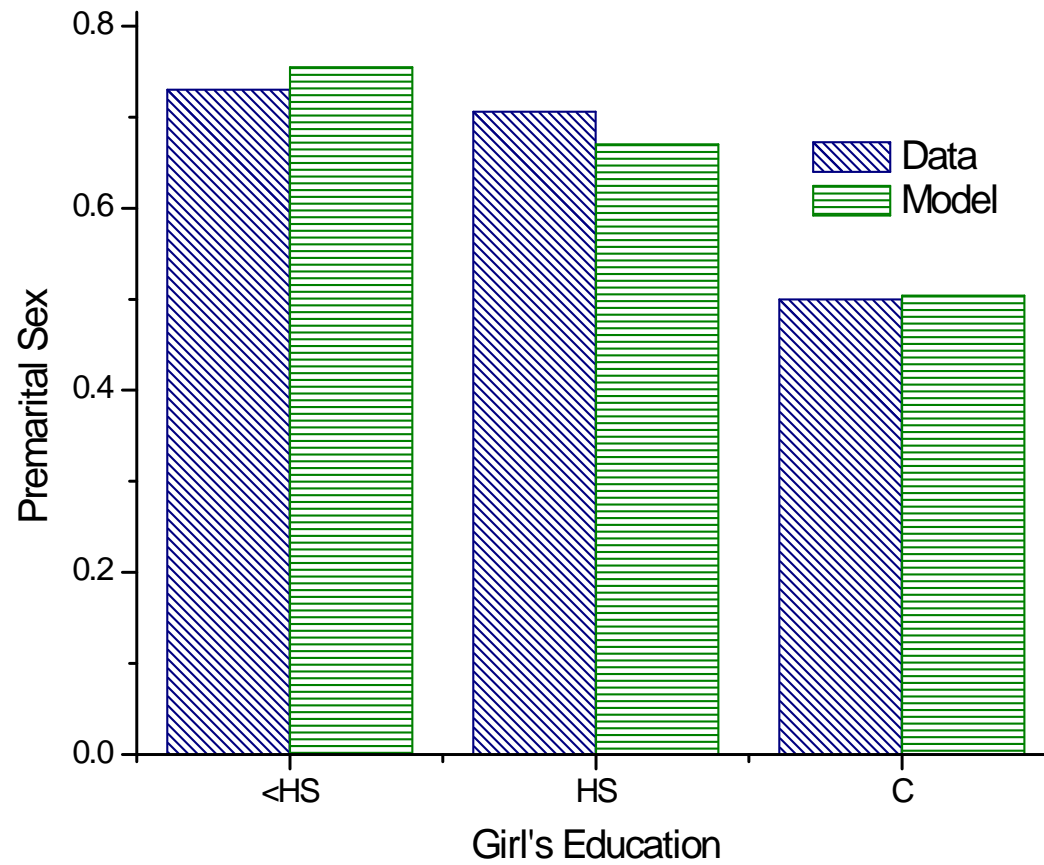
Figure 2: Cross-sectional relationship between the odds of a girl engaging in premarital sex and her educational background, data and model
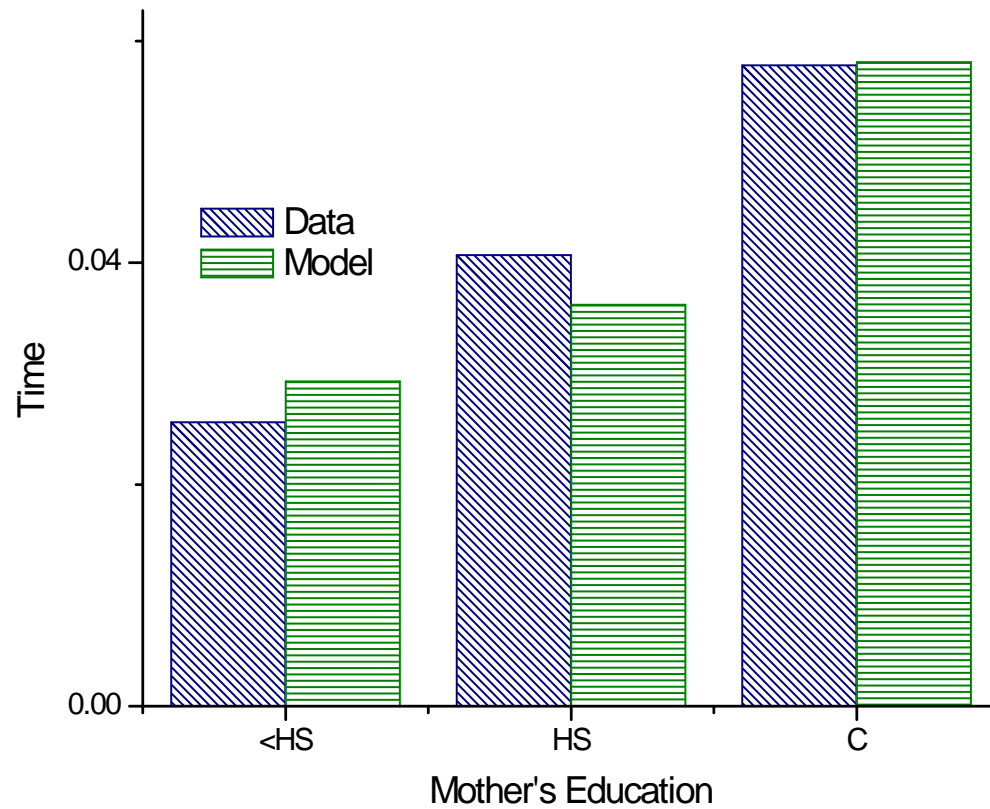
Figure 3: Cross-sectional relationship between the time spent with a daughter and the mother's educational background, data and model
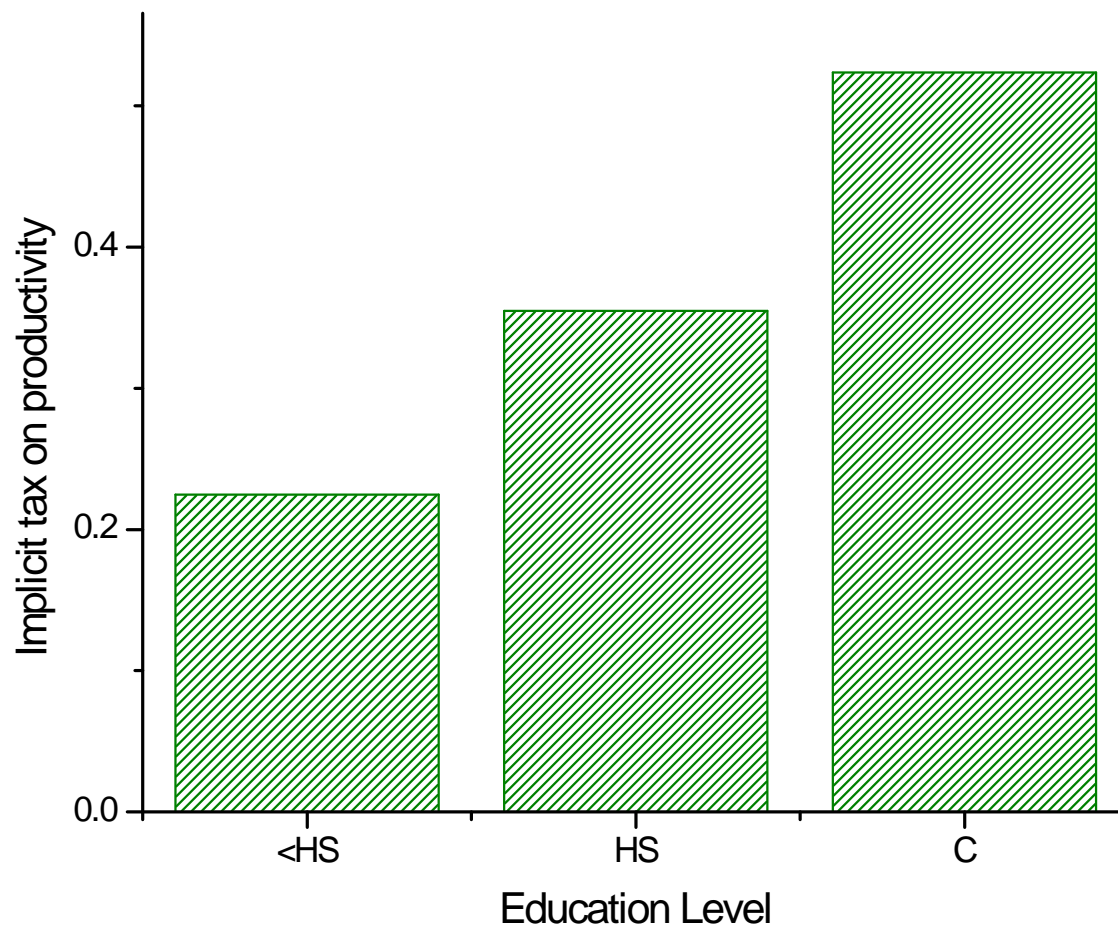
Figure 4: Implicit tax on an out-of-wedlock birth by education level, model
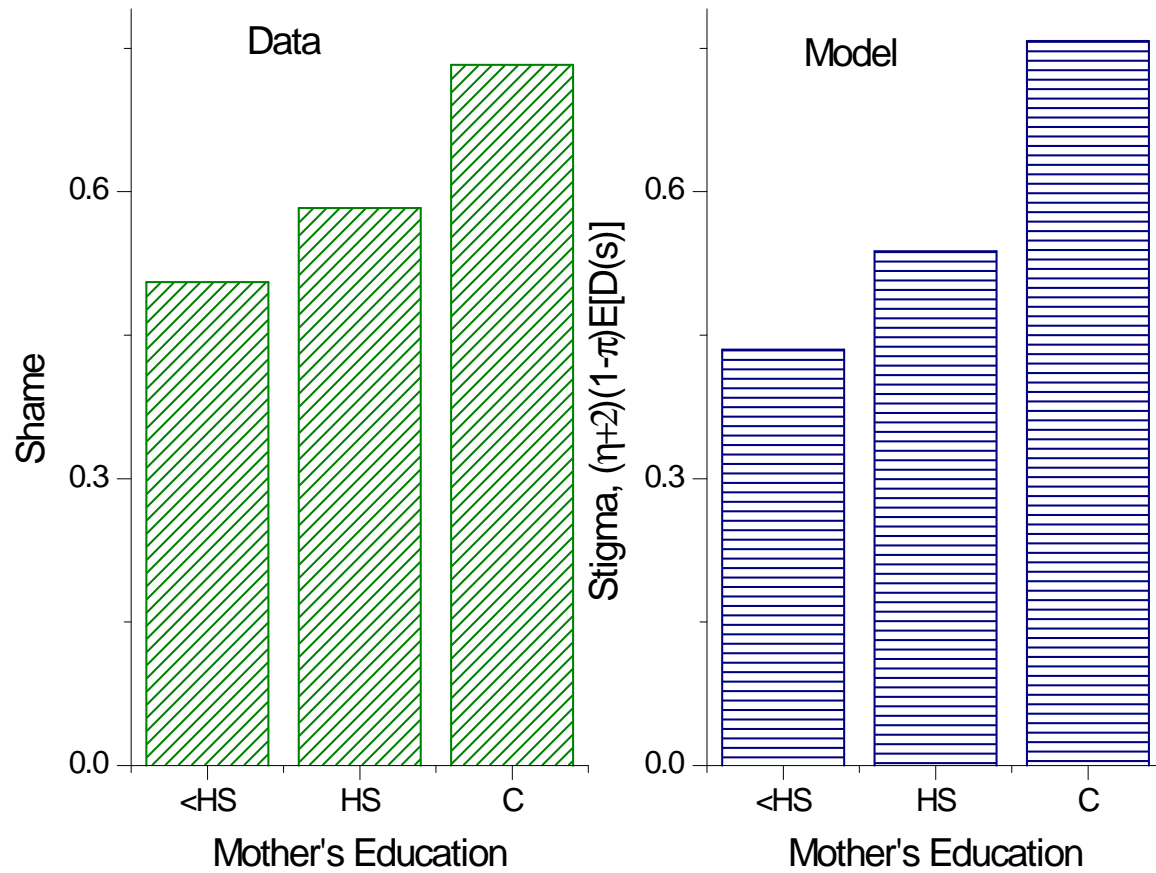
Figure 5: Cross-sectional relationship between the daughter's stigma from engaging in premarital sex and her mother's educational background

# 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, $\pi = 1 - 0.63/2 = 68\%$
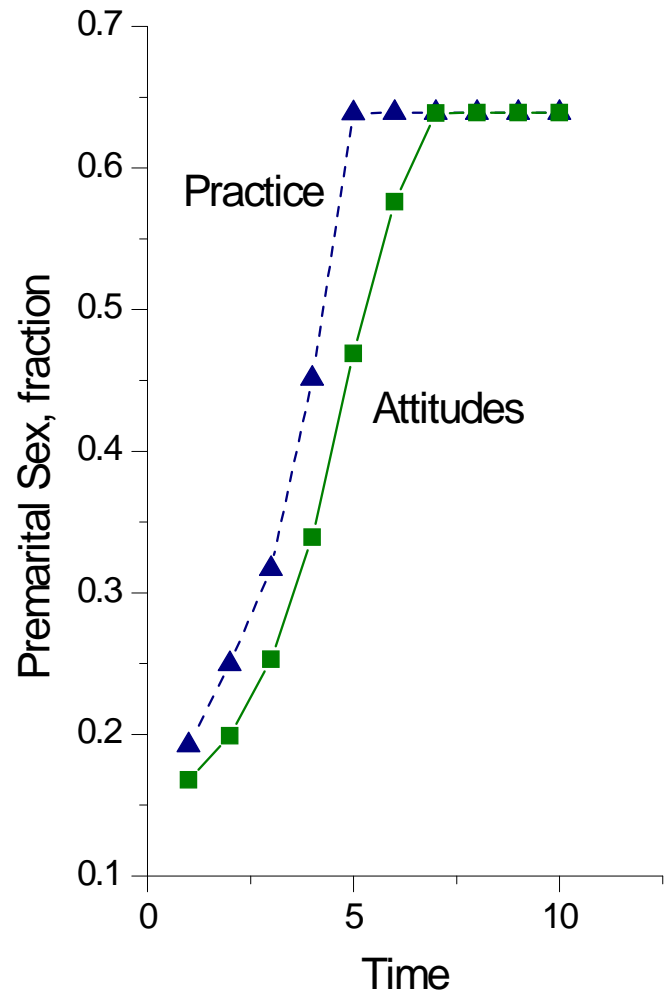
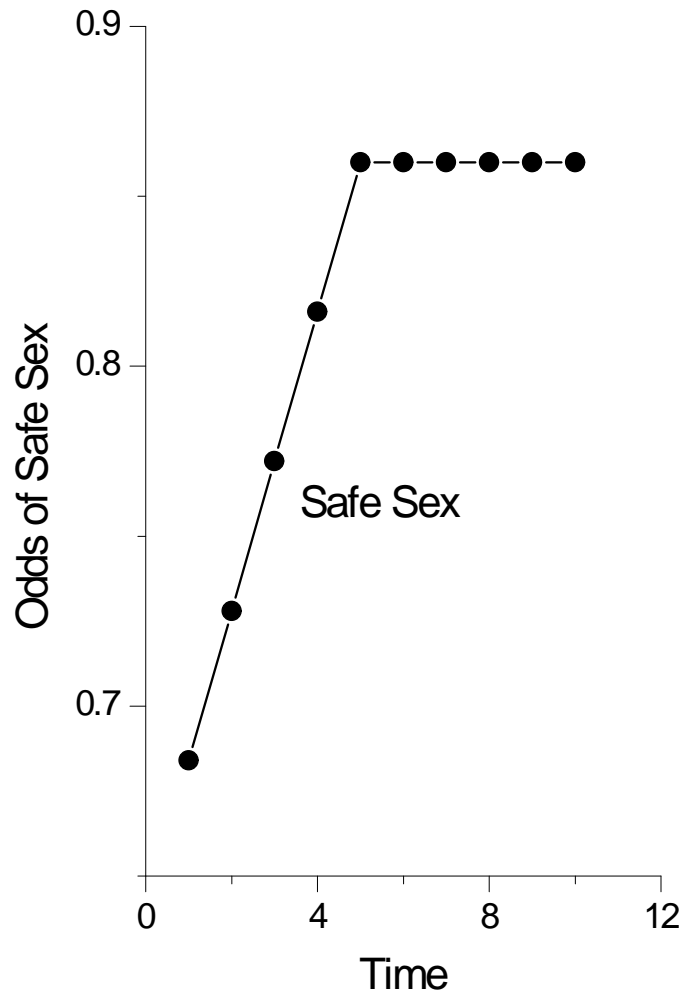- Put in historical time path for efficacy of contraception
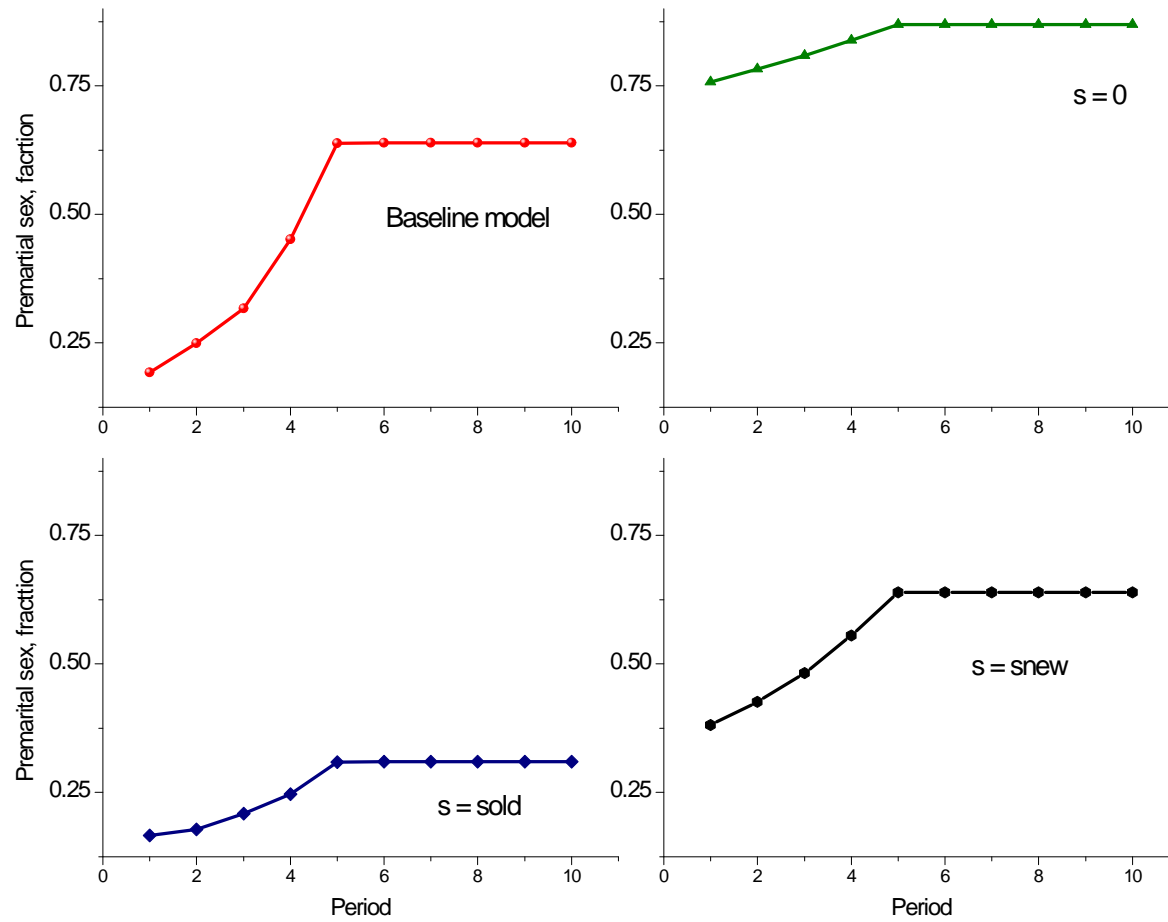
Figure 6: Sexual revolution

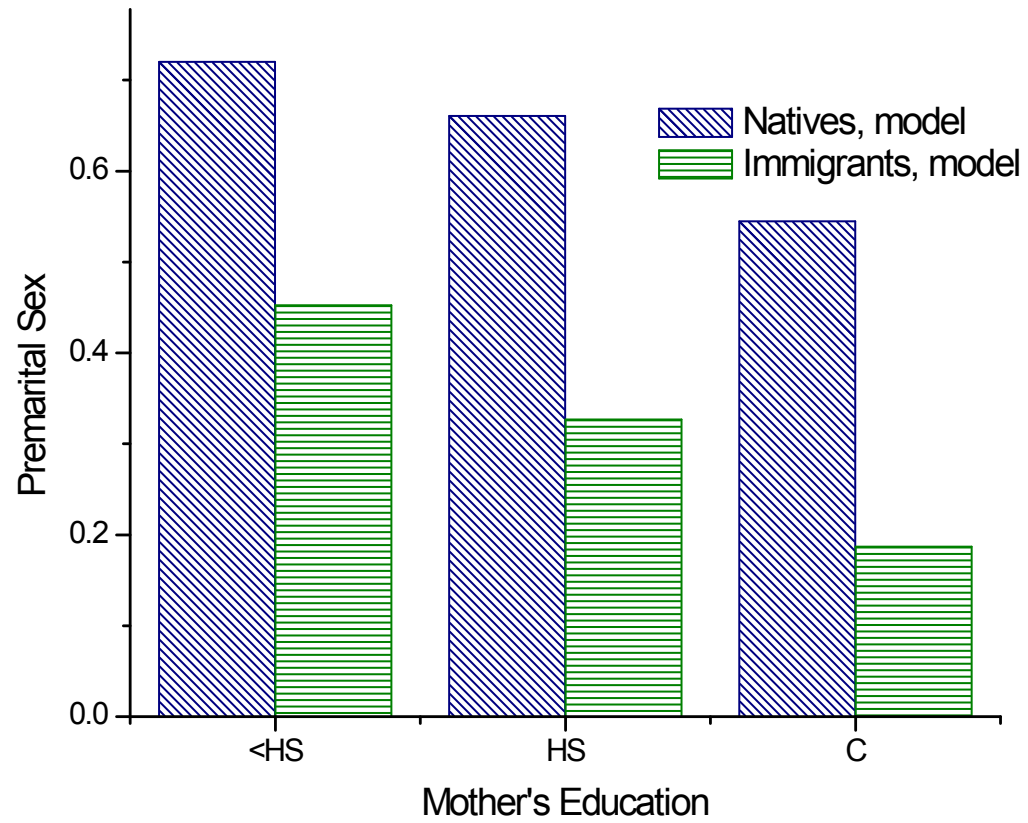Figure 7: The impact of socialization on premarital sex

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

- $O(\mathbf{r})$, opprobrium felt by parents if child has out-of-wedlock birth

  - $\mathbf{r}$, activity undertaken by church to generate this stigma

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

- Ramsey Problem

$$
\min_{\mathbf{r}}\{\sum_{I=0}^{1}\int \underbrace{(1-\pi)\Sigma(s,y_f')dP^y(y_f'|y_f)dF(y_f,I)}_{\text{out-of-wedlock births to daughters of type-}(y_f,I)\text{ parents}}
$$

$$
+ \underbrace{\nu\mathbf{r}^{\upsilon+1}/(\upsilon+1)}_{\text{cost}}\},
$$

subject to the parent's socialization decision rule

$$s = S(y_f, I; \mathbf{r}), \text{ for } I = 0, 1$$
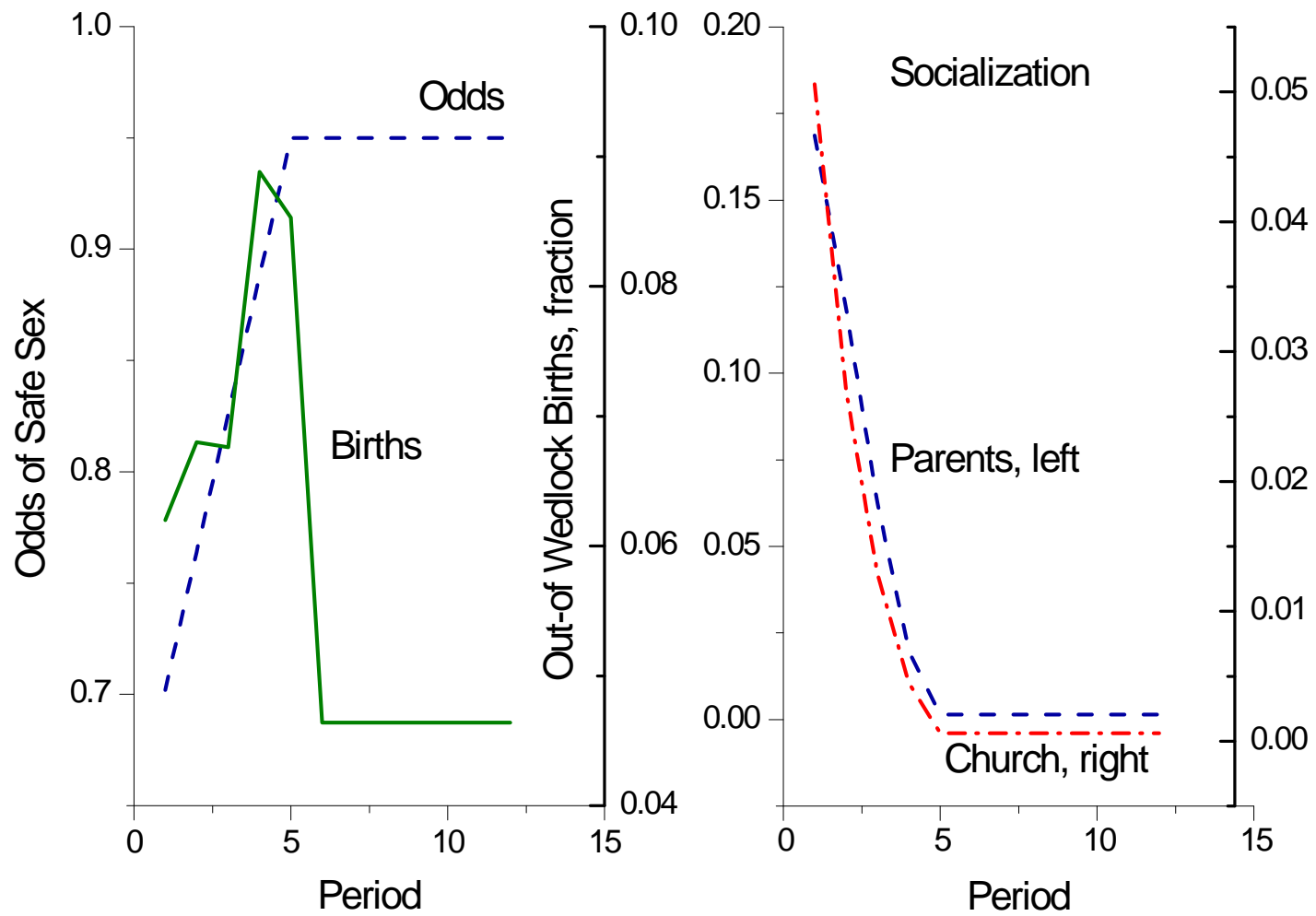
Socialization by church and parents

# 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