# Lecture – The Demand for Abortion: An Application of Expected Utility Theory

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## 1 Teen Motherhood and Abortion Access: Context

Question of the Kane and Staiger paper: What is the impact of limiting access to abortion on the frequency (rate) of teen motherhood?

- This question may seem too obvious to ask. There are only three possible answers (more births, fewer births, or no change) – and most people are quite sure they know which is correct. That's partly what makes it a good paper.

- Why is this an interesting question:

  1. Up until 1992, teen birthrates were rising, especially out of wedlock. (See K-S, Figure I)

  2. Simultaneously, there had been substantial reductions in abortion access (decline in providers, increase in legal and social impediments) since passage of Roe v. Wade in 1973. (See K-S, Figure III)

- Hence, a great testable hypothesis: Reductions in abortion availability explain rise in teen birth rates.

- (Note: To many the question is already answered just by looking at the figures. Students in 14.03 would not be so naive.)

- How do we evaluate the causal question?

  1. Cross-sectional:
     - Correlate teen birth rates with abortion access by city/state/county.
     - How do you interpret this?
       * Places that don't have access have **low** birth rates. This could just reflect 'strict attitudes' that limit teen behavior and the availability of clinics.

* Places that don't have access have **high** birth rates. Could be causal. But could reflect the local social norms, e.g., Mormons choose to have high fertility and do not condone abortion.

2. Changes over time:

   – Observe *changes* in teen births when abortion providers come and go.

   – This implicitly removes the part of variation due to stable attitudes or norms that affect birth rates and are constant.

   – Can think of this as a simple diff-in-diff model: comparing changes in birth rates in counties that had a reduction in abortion access to counties that did not.

   – Of course, if norms and access move together, does not solve the causality problem.

   – Hence, look for sharp changes in access and see if they result in changes in births.

## 1.1 Seems straightfoward – so why write a model?

- Why use a model?

  – Clarifies thinking, removes cobwebs from brain.

  – Makes clear the implicit assumptions that we bring to the analysis.

  – Most people already have a model in place, they just don't know it. [The unexamined model is not worth having.]

- What is the basic editorial page assumption about the impact of abortion availability on birth rates? Most likely: restrictions on abortion increase birth rates.

- What is the key assumption built into this model?

  – Pregnancy is "exogenous," i.e., predetermined or immutable.

  – Or at a minimum, people don't take into account availability of abortion when making decisions about sexual activity or contraception.

- Is this plausible? What factors might influence the probability that someone chooses to get pregnant?

  – Ability to care for the child.

  – Likelihood of the relationship with the partner continuing.

  – Marital status.

- Possibility of aborting pregnancy if turns out to be 'unwanted' (what economists call: Option Value).

- Consider:
$$\text{Teen Birth Rate } = \frac{\text{births}}{\text{teens}} = \frac{\text{pregnancies} \cdot \Pr(\text{birth}|\text{pregnant})}{\text{teens}}.$$

- Abortion unambiguously affects probability of birth conditional on pregnancy
$$\frac{\partial \Pr(\text{birth}|\text{pregnant})}{\partial(\text{abortion-access})} < 0.$$

- What about pregnancies? *If* abortion availability affects the number of pregnancies, it must be by increasing the number of pregancies. Availability of abortion makes pregnancy potentially more attractive.
$$\frac{\partial (\text{pregnancies})}{\partial(\text{abortion-access})} \geq 0.$$

- Whether abortion actually raises preganancy is a testable empirical question.

- Of course, an increase in pregnancy does not necessarily imply an increase in births. If abortion access raises pregnancies and raises abortions, net effect on births is ambiguous.

- But this tiny baby step towards formalization points out that the impact of abortion on births is ambiguous.

# 2 Stylized model

- Kane-Staiger offer a stylized model of sequential decision making under uncertainty.

- By stylized, we mean that it captures important salient features of the problem in a schematic form.

- It obviously leaves out thousands of other considerations. Important questoin is whether or not it captures (excludes) the right ones.

- The uncertainty faced by a woman in this model is whether a pregnancy will result in an in-wedlock or out-of-wedlock birth.

- The key operative assumption is that all else equal, an in-wedlock pregnancy gives higher utility.

- Is this likely to be true? Not in all cases, but probably on average.

- Parameters:

$$0 \;=\; \text{Utility of not becoming pregnant (normalization)}$$
$$1 \;=\; \text{Utility of in-wedlock birth (normalization)}$$
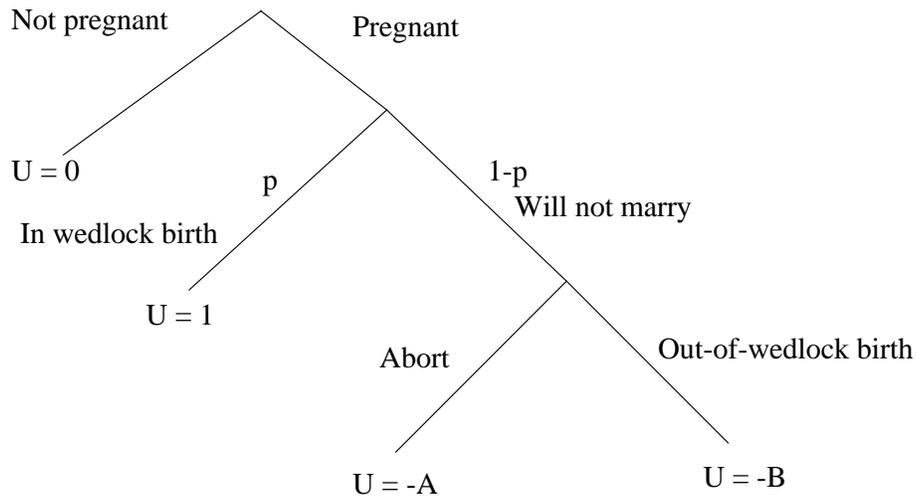$$P \;=\; \Pr(\text{In wedlock birth}|\text{pregnant})$$
$$B \;=\; \text{Disutility (psychic + monetary cost) of out-of-wedlock birth}$$
$$A \;=\; \text{Disutility (psychic + monetary cost) of abortion}$$

- The sequence of choices is (see Fig 1):

  Kane-Staiger                                                    12#1



1. Choose whether to become pregnant or not

2. If pregnant, learn about whether will be in wedlock. As above, probability is $P$ that will decide to marry.

3. If will marry, have baby.

4. If not married, choose 'least bad' alternative: a) have out-of-wedlock birth; b) have abortion.

- Do the assumptions in this model seem to describe the considerations faced by many potential mothers?

- We want to consider how a rise in $A$ affects pregnancies, abortions and births in this model.

- We are studying the affect of an increase in $A$ since this is the parameter that captures the variation analyzed by this study.

- Holding all other monetary and psychic costs constant, an increase in the distance to an abortion provider (perhaps because the provider closes in your county), raises the disutility of abortion $A$. An increase in distance makes $A$ larger ($-A$ more negative).

## 2.1 How does a rise in $A$ affect pregnancies, abortions, births?

- You want to solve this problem by *backward induction*. Start with the possible outcomes $\{0, 1, -\min[A, B]\}$, and work your way backwards up the tree to find the woman's best choice.

- Write the expected utility of a women facing this decision framework where $No, Yes$ represent decisions to become pregnant:
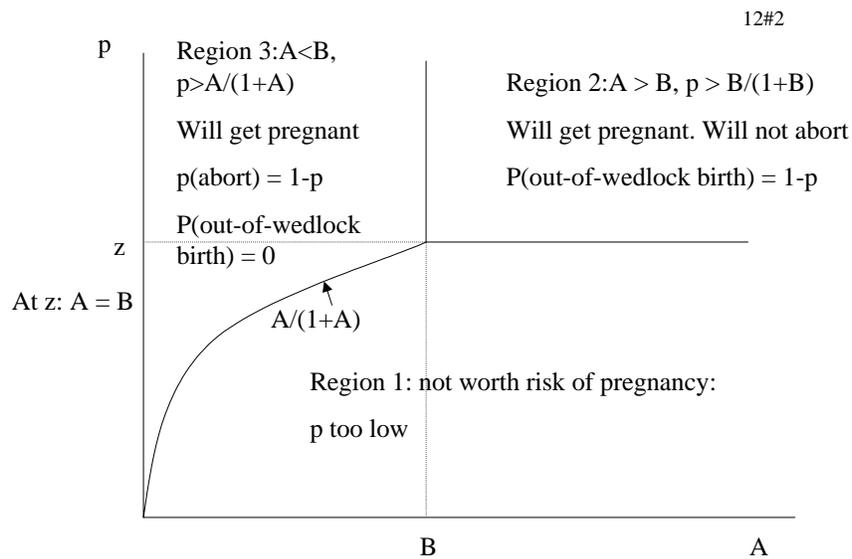
$$
\begin{aligned}
E(U|No) &= 0 \\
E(U|Yes) &= P \cdot 1 - (1 - P)\min(A, B)
\end{aligned}
$$

- Notice that the disutility of the non-marital outcome (which occurs with probability $1 - P$) is the minimum of the disutility of abortion or out-of-wedlock birth. In other words, women will always choose the least bad (most preferred) option.

- In this model, women choose to become pregnant iff:

$$
\begin{aligned}
P - (1 - P) \cdot \min(A, B) &> 0 \\
\frac{P}{1 - P} &> \min(A, B) \\
(\text{or})\ P &> \frac{\min(A, B)}{1 + \min(A, B)}
\end{aligned}
$$

- Bear in mind that *each woman* has her own $B, A$ and $P$. That is, she knows her own psychic cost of abortion and has her own assessment of $P$, the probability of an in-wedlock birth conditional on pregnancy. The policy variable here is $A$, the psychic cost of abortion. By reducing access to abortion providers, policy can potentially raise $A$ (somewhat) from whatever level a woman initially perceives it to be.

- See figure below. This represents a woman's decision options in $A - P$ space, i.e., as a function of the probability of in-wedlock birth conditional on pregnancy and the psychic/monetary cost of abortion.

- A reference level of $B$ is also chosen, representing the psychic cost of out-of-wedlock birth. It is critical to include $B$ in this figure since the cost of $A$ *only* matters if it less than $B$ (otherwise the cost of $B$ becomes relevant).

- Since both $B$ and $A$ will vary across women, this figure represents the choice for women with a given level of $B$ but with varying values of $P, A$.

- An individual woman in this figure can be depicted by a point $\{A, P\}$, where $A$ and $P$ are her personal disutility of abortion and expected probability of in-wedlock marriage conditional on pregnancy. We are fixing $B$ at some initial level since the graph does not have 3 dimensions. Since all that matter in this figure is the *difference between* $B$ and $A$, you can just as well think of $A$ as $A^0 = A - B$.

- There are three regions in this figure representing different decisions for given $A, B, P$.

- There are three possible sets of preferences depicted in this figure that depend on individuals' parameter values:

12#2

p

Region 3:A<B, p>A/(1+A)

Will get pregnant

p(abort) = 1-p

P(out-of-wedlock birth) = 0

Region 2:A > B, p > B/(1+B)

Will get pregnant. Will not abort

P(out-of-wedlock birth) = 1-p

z

At z: A = B

A/(1+A)

Region 1: not worth risk of pregnancy:

p too low

B

A

## 2.2   Region 1. Not planning to become pregnant:

$$P < \frac{\min(A, B)}{1 + \min(A, B)}$$

- A woman described by this equation chooses not to become pregnant b/c the probability of an in-wedlock birth is too low to make pregnancy attractive.

- [Remember that, by assumption, all women prefer *no birth* to an out of wedlock birth prior to pregnancy.]

**What happens if $A$ increases to $A' > A$ in Region 1?**

- For women in Region 1, the probability of an in-wedlock birth is too low to make pregnancy attractive. A rise in $A$ to $A'$ has no effect on behavior or well being. Impacts:

  - Pregnancies: null

  - Abortions: null

  - Births: null

  - Out-of-wedlock births: null

## 2.3   Region 2. Planning to get pregnant, will not abort.

$$
\begin{aligned}
A &> B \\
P &> \frac{B}{1+B}
\end{aligned}
$$

- The first equation says that these women find an out of wedlock birth preferable to an abortion.

- The second equation says that these women view the odds of an in-welock birth as sufficiently favorable to become pregnant.

- They *will* get pregnant and will not abort if the child if the marriage does not materialize.

$$
\begin{aligned}
P(\text{Abort}) &= 0 \\
P(\text{No-Wedlock}) &= 1 - P
\end{aligned}
$$

**What happens if $A$ increases to $A' > A$ in Region 2?**

$$
\begin{aligned}
A' &> A > B \\
P &> \frac{B}{1+B}
\end{aligned}
$$

- For this woman, a rise in $A$ to $A'$ also has no effect on behavior because abortion was never an attractive option. Impacts:

  - Pregnancies: null

  - Abortions: null

  - Births: null

  - Out-of-wedlock births: null

## 2.4 Region 3. Planning to get pregnant, will abort if out of wedlock

$$P > \frac{\min(A, B)}{1 + \min(A, B)}$$
$$A < B$$

- The first equation says that the odds of in-wedlock birth are sufficiently high that the agent will choose to become pregnant.

- The second equation says that, at the initial value of $A$, the agent will abort if the marriage is revealed to be out of wedlock.

$$P(\text{Abort}) = 1 - P$$
$$P(\text{No-Wedlock}) = 0$$

- This situation is depicted as Region 3, which extends vertically from above the curved line, $A/(1 + A)$ and extends horizontally to the point $B$.

- Region 3 can be further subdivided into two sub-regions: women whose value of $P$ is above or below $z$.

$$z \equiv \text{value of } P \text{ where } \frac{A}{1 + A} = \frac{B}{1 + B} \Rightarrow A = B.$$

1. (a) Women in Region 3a, with $P < z$, would abort if the child is out of wedlock. But would not become pregnant if abortion were too psychically costly since $P < \frac{B}{1+B}$.

   (b) Women in Region 3b, with $P \geq z$, would abort if out of wedlock. But notice that if abortion were too psychically costly, they would have an out-of-wedlock birth because $P > \frac{B}{1+B}$.

**What happens if $A$ increases to $A' > A$ in Region 3?**

### 2.4.1 Region 3b: $P \geq z$

- Women in Region 3b are planning to get pregnant and abort out if out of wedlock.

- But they would choose to have an out-of-wedlock birth rather than abort if $A' > B$.

$$A < B < A'$$
$$P > \frac{A}{1 + A}$$
$$P > \frac{B}{1 + B}$$
$$P > z$$

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- For these women, pregnancy is **exogenous.** The cost of abortion does not affect pregnancy *decision* because these women are willing to bear out-of-wedlock children rather than not get pregnant.

- An increase in $A$ moves them from Region 3b to Region 2 in the figure.

- Impact of rise in $A$:

  - Pregnancies: null

  - Abortions: −

  - Births: +

  - Births to married mothers: null

  - Births to unmarried mothers: +

- This appears to be the group that the standard newspaper account has in mind: will get pregnant regardless and would use abortion if available. Raising cost of abortion increases births to unwed mothers.

- Note that these births are in some sense "unwanted" in that women would have rather aborted before 'price' of abortion rose.

### 2.4.2 Region 3A: $P < z$.

$$
\begin{aligned}
A &< A' < B \\
P &> \frac{A}{1+A} \\
P &< \frac{A'}{1+A'} \\
P &< z
\end{aligned}
$$

- As in Region 3b, women in Region 3a are planning to get pregnant and abort out if out of wedlock.

- Given the rise in $A$ to $A'$, these women will now choose *not to get pregnant* because the cost of abortion in the case of out-of-wedlock is now too great to bear the risk (this follows from $P < z$).

- For these women, the pregnancy decision is **endogenous** to the availability of abortion. They desire in-wedlock births and abortion provides "insurance" to make this feasible.

- When the cost of insurance rises from $(1 - P) \cdot A$ to $(1 - P) \cdot A'$, these women choose not to become pregnant.

- They are moved from Region 3a to Region 1 of the figure.

- Impact of rise in $A$:

  - Pregnancies: $-$

  - Abortions: $-$

  - Births: $-$

  - Births to **married** mothers: $-$

  - Births to **unmarried** mothers: null

- *Abortions fall but births fall by more than abortions.* The reason is that for every 1 pregnancy averted, only $1 - P$ abortions is averted.

- Further, all of these averted children would have been in-wedlock: out-of-wedlock births rise *as a share of all births.*

- [For some women, $A' > A$ but $P > \frac{A'}{1+A'}$. Behavior will not change but abortion will become more psychically costly.]

## 2.5  Summarizing empirical predictions:

- **Small** rises in $A$ that yield $A < A' < B$ will reduce pregnancies, abortions, and births by inducing women to choose not to get pregnant.

  - In this case, the birth rate falls more than the abortion rate and the births averted would have been in-wedlock.

  - A decline in abortion access actually *reduces* births.

- **Large** increases in $A$ that yield $A < B < A'$, will affect two groups of women, those as above who would only get pregnant if abortion provided "insurance" and those who would choose to bear an out-of-wedlock child if abortion became too expensive.

  - Here, pregnancies and abortions will fall.

  - Total impact on births is ambiguous (depending on the size of the two groups).

  - Out of wedlock births can rise or fall (depending on the size of the two groups).

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# 3  Results

- Table III:

  - Distinction between cross-section and within-county over-time variation (akin to differences-in-differences).

  - Which source of variation do you find more credible?

- Table V:

  - Impact of abortion restrictions on out-of-wedlock births is positive but insignificant. (This contrasts with standard newspaper expectations).

  - Impact of abortion restrictions on in-wedlock births is negative, significant, and economically large. These are akin to the women moved from Region 3 to 1.

- Figure VI:

  - Closest thing to a 'natural experiment.' Single, large decreases of 50 miles or more in the distance to nearest abortion provider.

# 4  Welfare analysis: What is the affect of rise in $A$ to $A'$ on women's utility?

1. Women always in Region 1. Never planned to get pregnant. No effect on well-being $\Rightarrow$ Indifferent

2. Women in Region 2, i.e., those who never intended to abort under any circumstances

$$B < A < A' : P - (1 - P)B = P - (1 - P)B \Rightarrow \text{Indifferent}$$

3a Women who go from Region 3 → 1 (choose not to conceive):

$$P - (1 - P)A > 0 \Rightarrow \text{Worse off}$$

3b Women who go from Region 3 → 2 (choose to conceive out of wedlock rather than abort):

$$P - (1 - P)A > P - (1 - P)B \Rightarrow \text{Worse off}$$

4. Women who remain in Region 3 despite rise in cost of abortion (continue to conceive, abort if out-of-wedlock):

$$P - (1 - P)A > P - (1 - P)A' \Rightarrow \text{Worse off}$$

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- *Hence, 3 out of 5 groups of women are worse off. (*Men are also presumably worse off.)

- Women are worse off for three reasons:

  1. Not having children b/c didn't want to risk pregnancy without abortion option.
  2. Forced to bear out-of-wedlock children in cases where would have chosen not to get pregnant if had known that would have been out-of-wedlock.
  3. Raising psychic and monetary costs of abortion for women who continue to have them.

- So, do not confuse impacts on births with implications for women's well-being. Restricting access to abortion *harms women*, even if it results in fewer births (in this model).

- [Of course, it is a fundamental tenet of consumer theory (the Carte Blanche principle) that, under standard competitive conditions, restricting choice cannot make people better off.]

## 5 Conclusions

- Substantive:

  - Small reductions in abortion access may *increase* birth rates.
  - This comes at the price of definite harm to women.
  - Entire reduction is among in-wedlock births – presumably women who were only willing to get pregnant if they have the opportunity to abort should marriage plans go awry.
  - "Abortion as insurance."

- Economic:

  - A simple, explicit economic model of choice can put you miles ahead of the *implicit* models used in popular conversation, media.
  - The key insight of the economic model: rational, forward-looking behavior by individuals means that people respond to changes in their choice set by changing behavior.