Pricing the Biological Clock: Reproductive Capital on the US Marriage Market

Corinne Low

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Fertility, Career, and Marriage

- Older women have a much lower chance of conceiving than younger women (Women lose 97% of eggs by 40, Kelsey and Wallace 2010)
- Women face tradeoff between career and family (e.g., dearth of women in math-intensive fields, Williams and Ceci 2012)
- Older women face difficulty on marriage market (1986 TIME: "Better chance of getting killed by a terrorist")
- Does the age-fertility relationship create a tradeoff for women between income and optimal marriage?
- What accounts for the recent reversal in this trend, with older, educated women being increasingly likely to marry? (Stevenson and Isen 2010)

Summary

- I am interested in the economic value of fertility, and how this value may influence women's decisions.
- I propose a matching model of the marriage market that incorporates fertility, which I call **reproductive capital**
  - Suppose investing heavily in one's career (e.g., tenure, surgical residency, becoming partner at a law firm...) yields large earnings gains but delays marriage and childbearing
  - Creates choice for women between going on the marriage market as high income, low fertility (richer and older) or low income, high fertility (poorer and younger)
- Introducing this second factor allows for non-assortative matching on income at the top of the distribution

Model set-up

I develop a matching model with two relevant factors, fertility and income (Most closely related to Chiappori et al (2010)).

The model has four stages:

1. Women choose whether or not to invest in career
2. Matching occurs between men and women (those who have and have not invested)
3. The couple either has a child or does not
4. The couple allocates their income between private consumption and their child (a public good), if they have one

Model set-up

- Men characterized by income, y^h
- Women endowed with potential income, s
  - If women invest, they will get their full potential income, but doing so takes time, resulting in a loss of fertility
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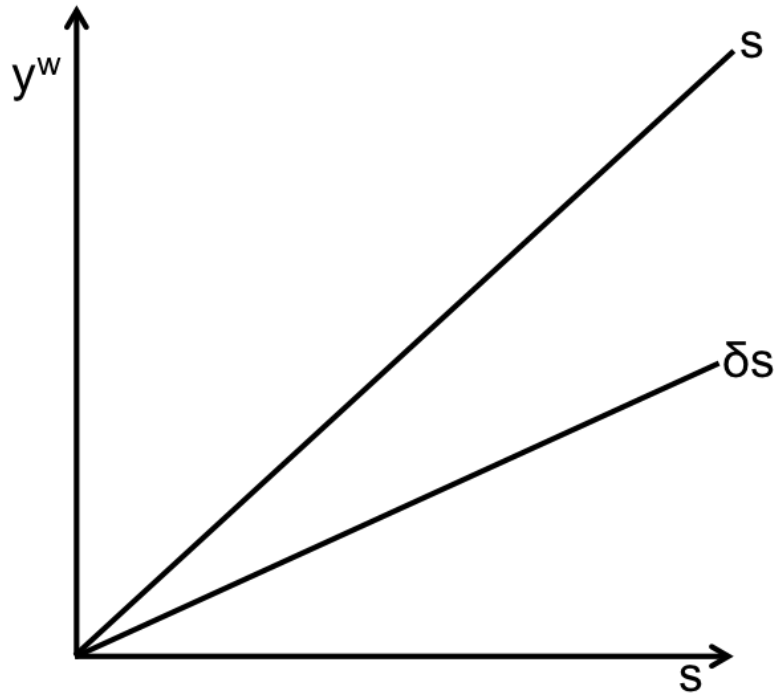
- Thus, women characterized by $(y^w, \pi) = \begin{cases} (\delta s, P) & \text{if no investment} \\ (s, p) & \text{if investment} \end{cases}$

  (where $\delta < 1$ and $p < P$)
- Note $P - p$ is the same for all women, whereas $s - \delta s$ is increasing in s

Stage 1: Women choose whether or not to invest

Figure: Income versus skill



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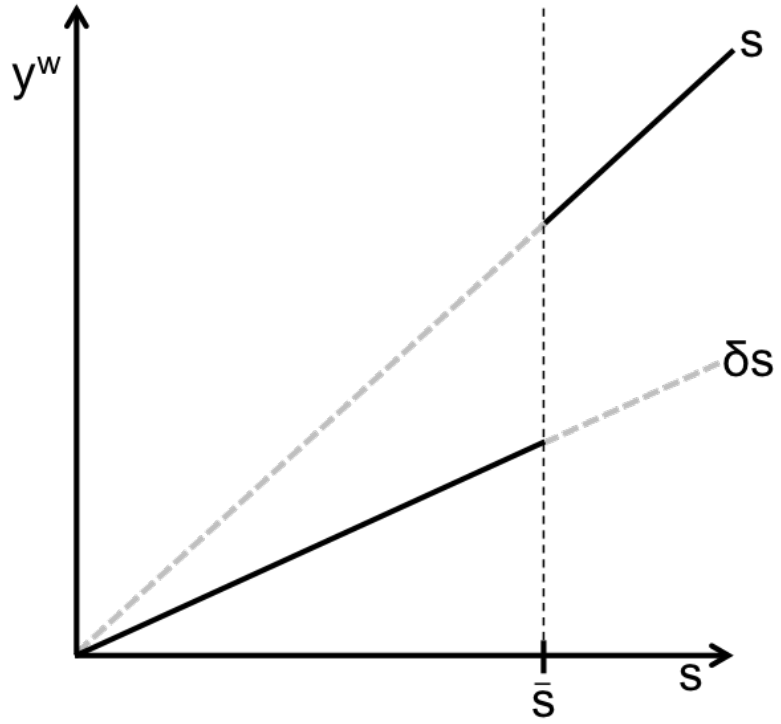

Stages 3-4: Household decisions

We will solve the model backwards:

- First, how will couple allocate in stage 4 if they have a child?
- Therefore, what will be the expected surplus in stage 3?
- Knowing this, what matching is optimal in stage 2?

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u^h(q^h, Q) &= q^h(Q+1) \\
u^w(q^w, Q) &= q^w(Q+1) \\
\text{BC: } q^h + q^w + Q &= y^h + y^w \\
\Rightarrow (q^h + q^w)^* &= \frac{y^h + y^w + 1}{2} \\
\Rightarrow Q^* &= \frac{y^h + y^w - 1}{2}
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$$
\boxed{T = \pi \frac{(y^h + y^w + 1)^2}{4} + (1-\pi)(y^h + y^w)}
$$

Stage 2: Matching game

What kind of matching equilibrium can we expect? On either side of the investment threshold, π is constant, and thus match is unidimensional:

$$\frac{\partial^2 T}{\partial y^h \partial y^w} > 0$$

$\Rightarrow$ Assortative matching conditional on investment choice

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What happens at the threshold? Examine how MRS of wife's two characteristics is changing in husband's income:

$$\frac{d\pi}{dy^w} = -\frac{\frac{\partial T}{\partial y^w}}{\frac{\partial T}{\partial \pi}}$$

$$\frac{\partial \left| \frac{d\pi}{dy^w} \right|}{\partial y^h} < 0$$

$\Rightarrow$ Value of fertility increasing in y^h. Richer men "care more" about fertility
$\Rightarrow$ Non-assortative matching possible at threshold

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- Let male income be distributed $U(1, Y)$
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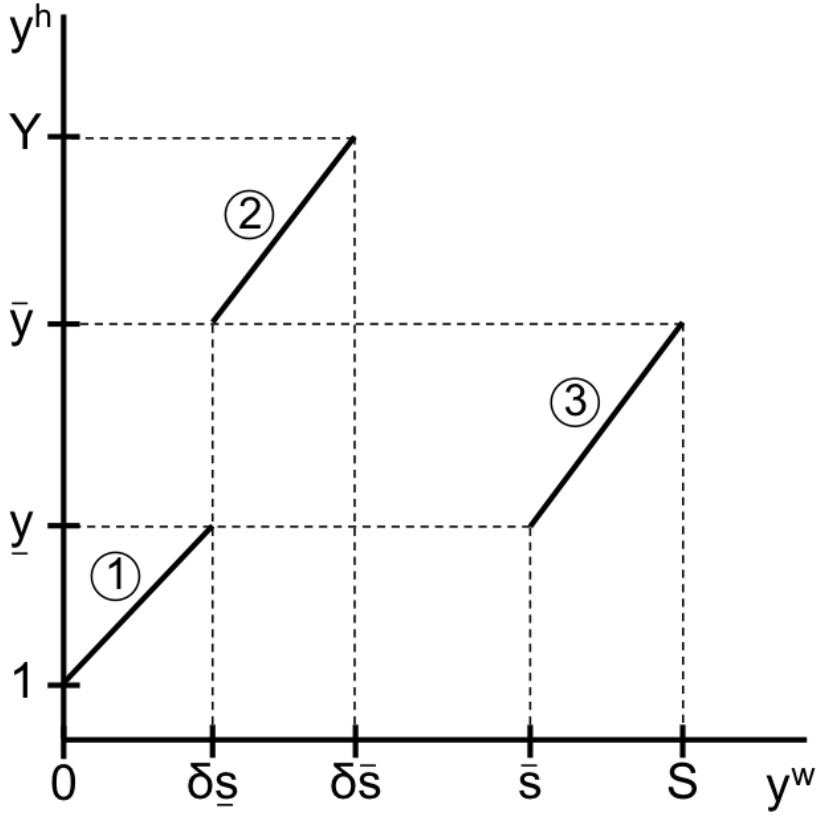
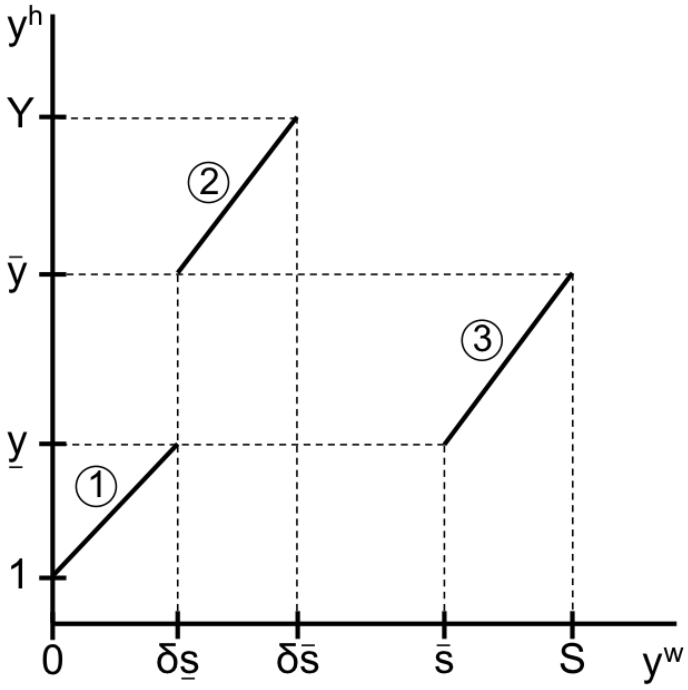
Figure: Stable equilibrium when $\frac{P-p}{p} > \frac{S}{Y-1}$



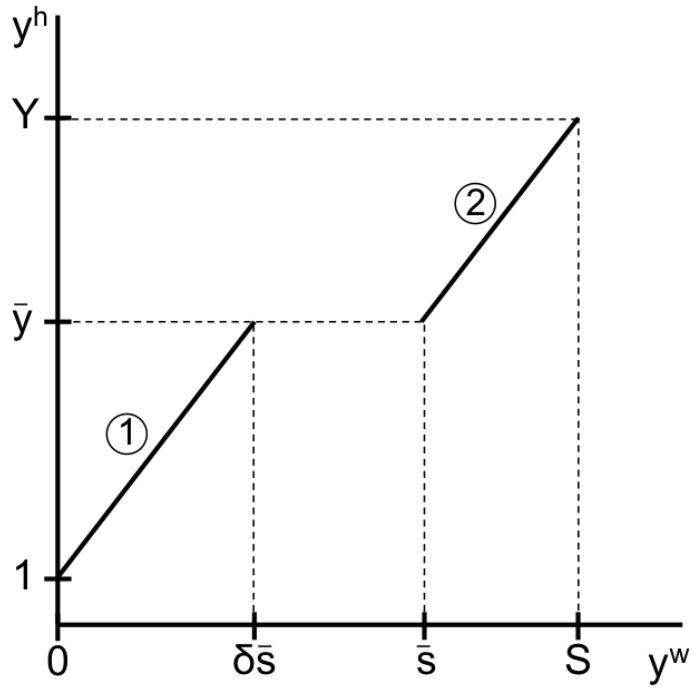
Stage 2: Possible matching equilibria

Figure: Equilibrium 1



- Three-segment equilibrium when $\frac{P-p}{p} > \frac{S}{Y-1}$

Figure: Equilibrium 2



- Assortative-matching equilibrium when $\frac{P-p}{p} < \frac{S}{Y-1}$ and $1-\delta$ sufficiently large

Potential historical transitions

Note that S, market opportunities for women, have likely changed over time (e.g. Hsieh et al 2012)

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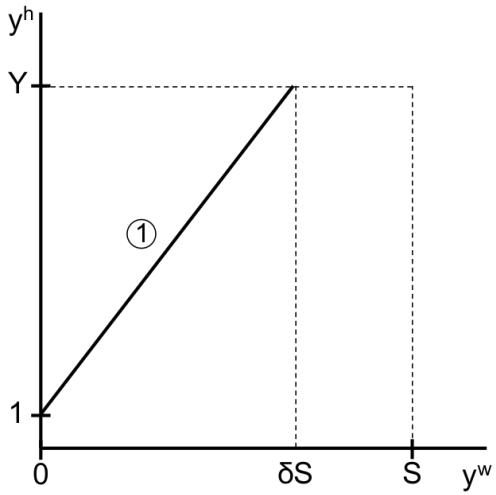

- Initially, the potential earnings for highly educated women are so low that few invest

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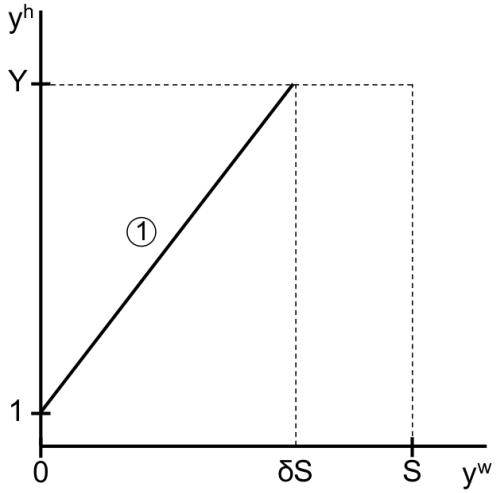

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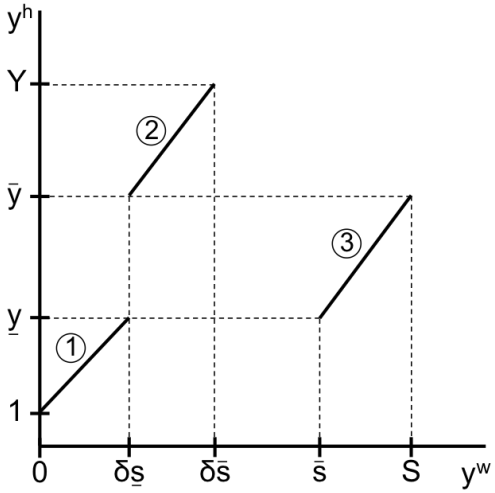
Figure: Phase 2



- As women's potential income (S) grows, some invest, but match with worse men

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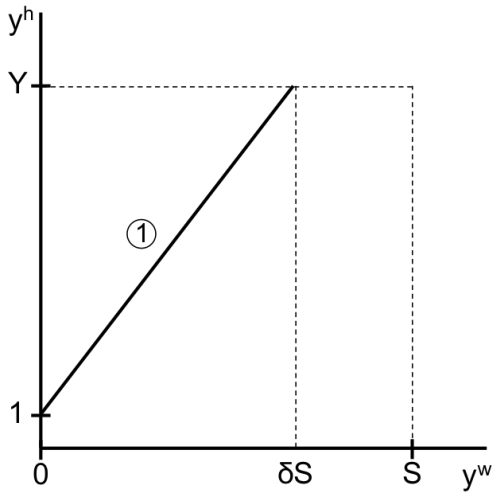

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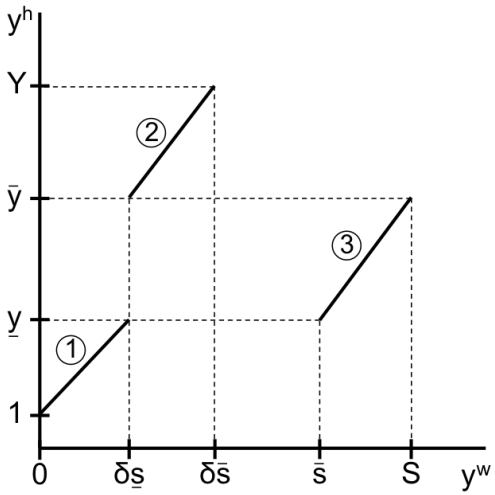
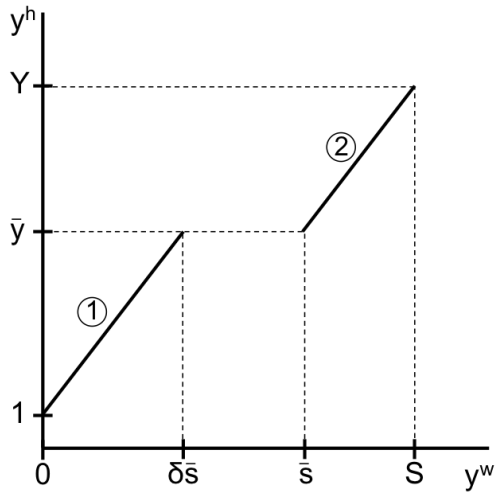


- As women's potential income (S) grows, some invest, but match with worse men

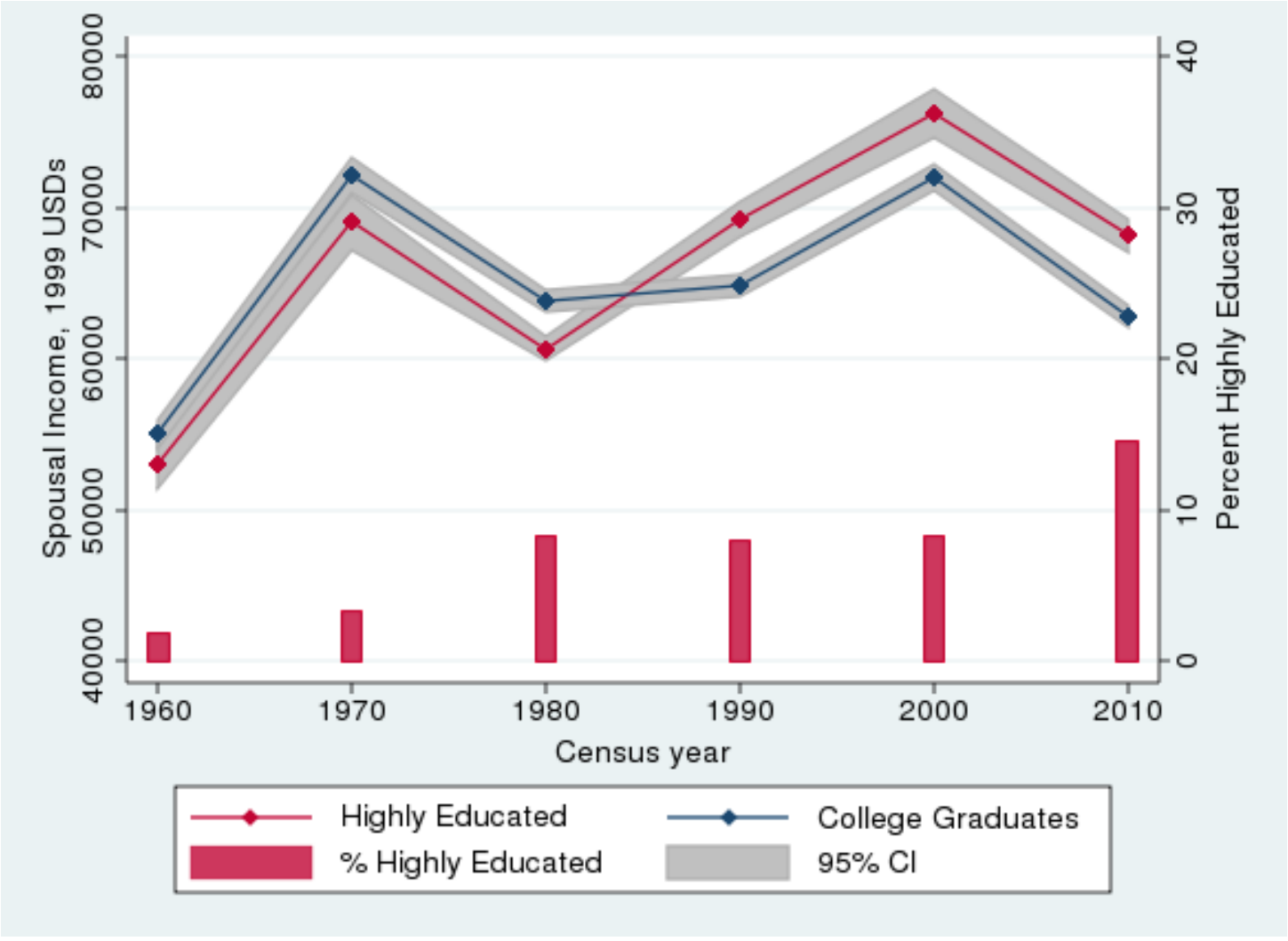
Figure: Phase 3



- Finally, S can compensate for lower fertility, and assortative matching returns

Higher education only recently offers a "marriage premium"

Figure: Spousal income by wife's education level



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VARIABLES	(1) Husband's income	(2) Husband's income	(3) Log husb. income	(4) Log husb. income
after1990	2,238***	2,238	-0.0748***	-0.0748
	(460.9)	(4,213)	(0.00627)	(0.0621)
highly_ed	-2,892***	-2,892*	-0.0523***	-0.0523*
	(690.6)	(1,396)	(0.00940)	(0.0223)
highlyXafter	7,142***	7,142***	0.0960***	0.0960**
	(794.6)	(1,458)	(0.0108)	(0.0246)
Constant	64,240***	64,240***	10.89***	10.89***
	(402.7)	(3,343)	(0.00547)	(0.0504)
Clustered Errors	N	Y	N	Y
Observations	135,886	135,886	134,333	134,333
R-squared	0.002	0.002	0.001	0.001

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1