Human Capital Investments and Expectations about Career and Family

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Summary I

Research questions and design

- What do students believe about the consequences of their education choices?
- How do students sort into majors?
- Novel: what role do family variables play in such choices?

- Survey with undergraduate students at NYU on perceptions about consequences of educational choices
- Specifically: choice of a major
- Follow-up survey after six years

Summary II

Results

- Students believe in importance of consequences for own earnings and family life
- Particularly women, major choice also corresponds to different rates and timing of marriage and fertility
- Belief about marriage market "return" to higher earning majors
- Ex-ante beliefs are systematically related to educational choices and ex-post realized outcomes

Model I

Human capital investment under uncertainty

- Expected utility for human capital choice at time τ:

$$E_{i,\tau}(V_k) = \sum_{t=\tau+1}^{T} \beta^{t-\tau} \int u_t(X)\, dG_{i,\tau}(X|k,t)$$

- with discount rate *beta* and outcome X for all subsequent periods given a human capital investment k
- $G_{i,\tau}(X|k,t)$ is the belief distribution about the outcome given human capital investments k

Model II

Belief distribution $G_{i,\tau}(X|k,t)$

- Survey design elicits beliefs $G_{i,\tau}(X|k,t)$ about the choice of a major
- Belief distrubtions have four characteristics:
  - reflect individual *uncertainty*
  - are *heterogenous*
  - can be *incorrect*
  - can evolve over time due to *learning*
- Natural limitation: elicitation of degree of uncertainty ask Jogibär if put here; also how do they elicit?

Model III

Different effects of human capital choices

- Ex-ante individual differences in beliefs

$$\Delta_{G,i}(k, k') = G_i(X|k, t) - G_i(X|k', t)$$

- Ex-post individual differences in potential outcomes

$$\Delta_{F,i}(k, k') = F_i(X|k, t) - F_i(X|k', t)$$

- Ex-post individual differences realized outcomes

$$\Delta_H(k, k') = H(X|k, t) - H(X|k', t)$$

with $H(X|k, t) = \frac{1}{M_k} \sum_{t \in \Omega_k} F_i(k = k^*, t)$

Current Population Characteristics I

- Earnings, employment, and marriage data for the US population using the 2009
- Not suited for causal inference; needs not reflect the student's beliefs
- Data from older cohort; includes not only high-ability participants
- But data is suited to document that career and family outcomes differ by educational choices in observational data

Current Population Characteristics II

Table 2: Descriptive Statistics of 2009 ACS Data

	Age 23		Age 30		Age 45	
	Male	Female	Male	Female	Male	Female
Earnings (in $10,000s)						
Science/Business	3.33	3.22	6.74	5.48+++	11.61	7.46+++
	(2.15)	(2.19)	(4.81)	(3.15)	(9.79)	(6.49)
Humanities	2.51	2.57	5.40	4.47+++	9.07	5.93+++
	(1.33)	(1.88)	(4.20)	(2.71)	(8.48)	(5.67)
No Degree	2.54	2.15+++	4.21	3.08+++	5.70	3.88+++
	(1.52)	(1.41)	(2.50)	(1.59)	(4.13)	(2.57)
p-value[a]	0	0	0	0	0	0
Spousal Earnings (in $10,000s)						
Science/Business	3.41	4.75+++	5.26	8.25+++	7.44	12.68+++
	(2.09)	(3.11)	(3.44)	(5.79)	(6.69)	(10.15)
Humanities	2.27	3.49+++	4.30	6.66+++	5.71	9.85+++
	(1.33)	(1.93)	(2.61)	(5.64)	(4.72)	(9.42)
No Degree	2.21	3.50+++	3.24	4.82+++	3.76	6.36+++
	(1.13)	(1.93)	(1.86)	(2.92)	(2.59)	(4.81)
p-value	0	0.003	0	0	0	0
Full-time Employed (%)						
Science/Business	38.5	42.4+++	80.86	64.40+++	82.68	58.42+++
Humanities	30.9	36.2+++	72.96	57.92+++	75.86	52.07+++
No Degree	40.1	34.4+++	66.53	46.51+++	67.88	52.44+++
p-value	0	0	0	0	0	0
Married (%)						
Science/Business	8.2	15.9+++	61.72	67.49+++	80.79	76.14+++
Humanities	11.5	15.3+++	55.7	64.94+++	76.58	74.51+
No Degree	15.2	26.4+++	54.86	59.29+++	69.3	69.65
p-value	0	0	0	0	0	0

Earnings and spousal earnings shown in $10,000s.
Mean (standard deviation) shown for the continuous outcomes.
+++, ++, + gender differences statistically significant at the 1, 5, and 10% levels, respectively. Symbols denoted on female column.
[a] p-value of a F-test of the joint equality of means across majors. p-value of zero implies p-vlaue < 0.001.

Earnings Beliefs: Earnings Levels

Table 3: Self Earnings

	Age 23		Age 30		Age 45	
	Male	Female	Male	Female	Male	Female
Panel A: Levels (in 10,000s of dollars)						
Science/Business	5.93	5.39	13.74	10.86++	19.00	13.81+++
	(7.32)	(4.66)	(16.61)	(9.31)	(22.38)	(14.12)
Humanities	4.71	3.94	6.87	6.86	11.03	9.60
	(7.38)	(3.51)	(5.51)	(7.4)	(13.53)	(11.75)
No Degree	3.50	2.45++	5.07	3.27++	8.97	5.86+++
	(7.54)	(1.16)	(11.0)	(4.56)	(15.95)	(10.22)
Overall	5.60	4.68+	12.95	9.21+++	18.44	12.33+++
	(7.36)	(3.81)	(16.35)	(8.45)	(22.52)	(13.90)
Panel B: Individual Log Differences						
Sci/Business versus. Humanities	.267***	.304***	.523***	.425***++	.446***	.347***+
	(.019)	(.017)	(.048)	(.025)	(.051)	(.026)
Graduate versus. No Degree	.594***	.642***	1.022***	1.038***	.829***	.833***
	(.033)	(.026)	(.055)	(.037)	(.054)	(.038)

Panel A shows the mean and standard deviations of expected earnings (in $10,000s). +++, ++, + denote gender differences are statistically different at the 1, 5, and 10% levels, respectively.
Panel B shows the avg. log differences and standard deviations in parentheses. ***, **, * denote the means are statistically different from zero at the 1, 5, and 10% levels, respectively. +++, ++, + (shown on the female column) denote gender differences are statistically different at the 1, 5, and 10% levels, respectively.

Earnings Growth

Table 4: Earnings growth beliefs

	Age 23-30		Age 30-45	
	Male	Female	Male	Female
Panel A: Levels (in %)				
Science/Business	.67	.63	.25	.19
	(.72)	(.65)	(.47)	(.54)
Humanities	.41	.51+	.32	.27
	(.56)	(.53)	(.45)	(.52)
No Degree	.23	.21	.47	.43
	(.78)	(.55)	(.74)	(.58)
Overall	.66	.6	.29	.23
	(.73)	(.58)	(.48)	(.52)
Panel B: Individual differences				
Sci/Business versus. Humanities	.26***	.12***+++	-.08*	-.08***
	(.05)	(.03)	(.04)	(.03)
Graduate versus. No Degree	.42***	.39***	-.19***	-.2***
	(.06)	(.03)	(.06)	(.03)

Panel A shows the mean and standard dev of beliefs about earnings growth (in %).
+++, ++, + denote gender differences are statistically different at the 1, 5, and 10% levels, respectively.
Panel B shows average log differences and standard deviations in parentheses.
***, **, * denote means are statistically different from zero at the 1, 5, and 10% levels, respectively. +++, ++, + (shown on the female column) denote gender differences are statistically different at the 1, 5, and 10% levels, respectively.

Earnings Uncertainty

Table 5: Age 30 Earnings Uncertainty - Std deviations from fitting a Beta Distribution

	Male	Female
Panel A: Levels (in $10,000)		
Science/Business	9.17	9.49
	(1.44)	(2.48)
Humanities	10.34	10.01
	(27.44)	(2.32)
No Degree	14.73	15.27
	(7.34)	(7.53)
Overall	9.71	9.68
	(2.02)	(2.01)
Panel B: Individual differences		
Sci/Business versus. Humanities	-.11***	-.057***+++
	(.014)	(.012)
Graduate versus. No Degree	-.305***	-.335***
	(.052)	(.043)

Panel A shows the mean and std dev of age 30 earnings uncertainty beliefs (in $10,000). Uncertainty is the standard deviation of the individual-specific (beta-) fitted earnings distribution.
+++, ++, + denote gender differences statistically different at the 1, 5, and 10% levels, respectively.
Panel B shows average log differences and standard deviations in parentheses. ***, **, * denote means are statistically diff from 0 at the 1, 5, and 10% levels, respectively. +++, ++, + (shown on female column) denote gender differences are statistically different at the 1, 5, and 10% levels, respectively.

Beliefs about Marriage

Table 6: Beliefs about Marriage

Prob Marriage:	Age 23		Age 30		Age 45	
	Male	Female	Male	Female	Male	Female
Panel A: Levels (0-1 scale)						
Science/Business	.148	.167	.593	.594	.804	.778
	(.207)	(.214)	(.286)	(.271)	(.248)	(.253)
Humanities	.152	.182	.601	.66++	.797	.800
	(.214)	(.229)	(.291)	(.268)	(.253)	(.246)
No Degree	.153	.221+++	.535	.605++	.727	.743
	(.219)	(.26)	(.329)	(.29)	(.302)	(.287)
Overall	.149	.179	.589	.634+	.797	.793
	(.213)	(.225)	(.288)	(.266)	(.25)	(.242)
Panel B: Individual Log Differences						
Sci/Business versus. Humanities	-.008	-.096*	-.024	-.147***++	.013	-.020
	(.046)	(.053)	(.042)	(.039)	(.014)	(.024)
Graduate versus. No Degree	.075	-.192**+	.354***	.127**++	.317***	.161***
	(.099)	(.091)	(.11)	(.054)	(.09)	(.054)

Panel A shows the mean and standard deviations of marriage beliefs. +++, ++, + denote gender diffs are statistically significant at the 1, 5, and 10% levels, respectively.
Panel B shows the average log differences and standard deviations in parentheses.
***, **, * denote the means are statistically different from zero at the 1, 5, and 10% levels, respectively. +++, ++, + (shown on the female column) denote gender differences are statistically significant at the 1, 5, and 10% levels, respectively.

Beliefs about Potential Spousal Earnings

Table 7: Beliefs about Potential Spousal Earnings, Conditional on Own Major (and Own Age)

	Age 23		Age 30		Age 45	
	Male	Female	Male	Female	Male	Female
Panel A: Levels (in 10,000s of dollars)						
Science/Business	5.06	5.74+	9.00	10.76++	11.29	13.68+
	(4.12)	(3.92)	(7.72)	(9.14)	(13.25)	(13.67)
Humanities	4.52	4.75	7.05	7.86	8.02	11.07+++
	(7.35)	(3.75)	(8.93)	(7.69)	(7.95)	(12.90)
No Degree	4.58	3.46	4.57	5.54	6.25	7.76
	(11.99)	(2.26)	(5.56)	(9.11)	(9.89)	(12.03)
Overall	5.02	5.30	8.42	9.74+	10.77	12.73
	(5.90)	(3.88)	(7.60)	(8.91)	(13.20)	(13.61)
Panel B: Individual Log Differences						
Sci/Business versus. Humanities	.185***	.198***	.282***	.292***	.241***	.221***
	(.019)	(.015)	(.044)	(.024)	(.04)	(.026)
Graduate versus. No Degree	.432***	.481***	.687***	.741***	.587***	.632***
	(.048)	(.028)	(.05)	(.041)	(.054)	(.039)

Panel A shows the mean and standard dev of beliefs about spouse's expected earnings (in $10,000s) conditional on own major.
+++, ++, + denote gender differences are statistically different at the 1, 5, and 10% levels, respectively.
Panel B shows avg. log differences and standard deviations in parentheses. ***, **, * denote means are statistically different from zero at the 1, 5, and 10% levels, respectively. +++, ++, + (shown on the female column) denote gender differences are statistically different at the 1, 5, and 10% levels, respectively.