# 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

- 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  $\tau$ :

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

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

- Do beliefs actually influence intended and actual decisions?
- Intended major and actual major are outcome variables in the analysis

Table 14: (Intended and Actual) Major Choice and Expectations about Career and Family

		Intende	Actual Major			
	OLS		LA	AD	Multinon	nial Logit
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Females						
Age 30 Earnings (\$10,000s)	0.146***	0.099**	0.230***	0.183**	0.084*** (0.019)	0.037 (0.026)
Ability Rank	0.029***	0.029***	0.035***	0.039*** (0.004)	0.021*** (0.004)	0.022***
Prob Marriage by Age 30	(0.001)	-0.251 (0.706)	(0.000)	-0.171 (0.713)	(0.00.1)	1.444**
Spousal Earnings (\$10,000s)		0.087*** (0.028)		0.083 (0.059)		0.110***
Exp num of children by 30		0.306*		0.603***		0.575***
Constant	-1.473*** (0.206)	-1.266*** (0.250)	-1.445*** (0.188)	-0.878*** (0.262)		(0.143)
Pvalue (Family variables) <sup>a</sup>	247	0.0124	247	0.0088	105	0.000
Number of Individuals	317	317	317	317	185	185
Observations	634	634	634	634	555	555
(Pseudo) R-squared	0.192	0.219	0.1323	0.1484	0.157	0.2399

dep. variable is the intended likelihood of choosing a major.

Cols (5)-(6) show estimates from a multinomial logit regression, where the dependent

variable is the actual major at graduation.

Robust standard errors in parentheses. \*\* p<0.01, \*\* p<0.05, \* p<0.1. \* p<0.1. \* p<0.05, \* p<0.1. of children are jointly zero.

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Panel B: Males						
Age 30 Earnings (\$10,000s)	0.095***	0.093***	0.105**	0.102**	0.407***	0.410***
	(0.026)	(0.026)	(0.047)	(0.051)	(0.074)	(0.080)
Ability Rank	0.024***	0.025***	0.018***	0.018***	0.002	0.002
•	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
Prob Marriage by Age 30		0.704		1.513		0.569
		(1.049)		(1.517)		(1.383)
Spousal Earnings (\$10,000s)		0.029		0.018		-0.010
		(0.029)		(0.081)		(0.046)
Exp num of children by 30		0.202		0.242		0.211
•		(0.234)		(0.225)		(0.234)
Constant	-0.423*	-0.243	-0.178	-0.018		
	(0.235)	(0.290)	(0.138)	(0.223)		
Pvalue (Family variables) <sup>a</sup>		0.5248		0.6978		0.8005
Number of Individuals	176	176	176	176	88	88
Observations	352	352	352	352	264	264
(Pseudo) R-squared	0.159	0.167	0.0744	0.0803	0.39	0.3953

Cols (1)-(2) show OLS estimates. Cols (3)-(4) show Least Absolute Deviation estimates. The

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#### 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: Des	criptive	Statistics	of 2009	ACS Data
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	A	ge 23	A	ge 30	A	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+++	
Science/Business	(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+++	
numanities	(1.33)	(1.88)		(2.71)	(8,48)	(5,67)	
N- D			(4.20)			3.88+++	
No Degree	2.54	2.15+++	4.21	3.08+++	5.70		
la	(1.52)	(1.41)	(2.50)	(1.59)	(4.13)	(2.57)	
p-value <sup>a</sup>	U	U	U	U	U	U	
Spousal Earnings (in \$10	(2000						
Science/Business	3.41	4.75+++	5.26	8.25+++	7.44	12.68+++	
Science/Business	(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+++	
Tumanices	(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+++	
No Degree	(1.13)	(1.93)	(1.86)	(2.92)	(2.59)	(4.81)	
p-value	(1.13)	0.003	(1.80)	(2.92)	(2.59)	(4.01)	
p-value	U	0.003	U	U	U	U	
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	
p rande				•			
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	
Paris and a second and a second		- ¢10 000-					

Earnings and spousal earnings shown in \$10,000s.

Mean (standard deviation) shown for the continuous outcomes.
+++, ++, epender differences statistically significant at the 1, 5, and 10% levels, respectively. Symbols denoted on female column.

"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

Tab	le	3:	Sel	f F	arn	ings
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	Age	Age 23		ge 30	Age 45		
	Male	Female	Male	Female	Male	Female	
Panel A: Levels (in 10,000s of do	llars)						
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+++	
Ç.	(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 Difference	es						
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: Farnings growth beliefs

Table 4: Ear	mings gro	wtn beneis		
	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)			
		0.40	
Science/Business	9.17	9.49	
	(1.44)	(2.48)	
Humanities	10.34	10.01	
	(27.44)	(2.32)	
N- D	14.73	15.27	
No Degree			
	(7.34)	(7.53)	
Overall	9.71	9.68	
	(2.02)	(2.01)	
	(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.

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: Reliefs about Marriage

Table 6. Beners about Marriage							
Prob Marriage:	Age 23		A	Age 30		Age 45	
	Male	Female	Male	Female	Male	Female	
Panel A: Levels (0-1 scale)							
Science/Business	.148	.167	.593	.594	.804	.778	
Humanities	(.207)	(.214) .182	(.286) .601	(.271) .66++	(.248) .797	(.253)	
	(.214)	(.229)	(.291)	(.268)	(.253)	(.246)	
No Degree	(.219)	.221+++	(.329)	.605++	(.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	
Graduate versus. No Degree	(.046) .075	(.053) 192**+	(.042)	(.039) .127**++	(.014) .317***	(.024) .161***	
2	(.099)	(.091)	(.11)	(.054)	(.09)	(.054)	

Panel A shows the mean and standard deviations of marriage beliefs. +++, ++, + denote gender diffs are

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	
Overall	(11.99) 5.02	(2.26) 5.30	(5.56) 8.42	(9.11) 9.74+	(9.89) 10.77	(12.03) 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.