Beliefs and Life Choices

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March 15th, 2023

PhD Course: Subjective Beliefs, Attention and Economic Behavior
CEBI Copenhagen

Examples of Life Choices

Individuals take important and far-reaching decisions based on their expectations and preferences:

- Education Choices
- Occupation and Job Choice
- Marriage and Divorce, Fertility, Parenting
- ... other decisions that have implications for your future

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- ... other decisions that have implications for your future

I am particularly interested in systematic inequality

- by gender
- by parental background

Agenda for this lecture

- Education Choice
  - College major choice: Two Survey-based papers by Basit Zafar and Matthew Wiswall (REStud 2015, JPE 2021)
  - School track choice at age 15: One early-stage project of mine

- Occupation Choice
  - Preferences over job characteristics and career choice: Paper by Basit Zafar and Matthew Wiswall (QJE 2018)
  - Brief sketch of own research idea

- Career vs. Parenting
  - Not covered, but let me know if you want to have a chat!

Understanding educational choices

- Key issue: How do we identify the determinants of educational choice (college or not; college major)?

- Tastes versus (earnings) expectations:
  - How responsive are individuals to changes in labor market returns to HK investments?
  - College majors: Are men more likely than women to major in engineering because they expect to earn more in engineering or because they have a higher taste for engineering subjects?

- Zafar and Wiswall (2015, 2021): Focus on college major choice
  - Large earnings differences: Avg. earnings for engineering majors 25% higher than for humanities
  - Accounts for gender difference in LM outcomes

Wiswall and Zafar (2015, 2021)

- Both papers investigate how ex ante beliefs affect major choice

- Elicit ex ante beliefs for a large set of events, *conditional* on different majors (science/business, humanities)
  - events include expected earnings at multiple ages, marriage prospects, fertility, spousal earnings, labor supply
  - measurement of actual subjective beliefs $\rightarrow$ no longer necessary to assume rational expectations

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- REStud 2015: Causal effect of expectations on intended major choice
- JPE 2021: Descriptive paper, non-monetary expected returns, "verify" expectations based on actual outcomes six years after

Survey Instrument & Data Collection

- Survey with approx. 500 undergraduate students at NYU, duration=90 minutes

- Define 5 potential "majors": (1) Business; (2) Engineering; (3) Humanities; (4) Natural Sciences; (5) Not Graduate.

- Elicit expectations about future life outcomes|major choice for *self* and for *population*:
  - Earnings at age 23, 35, and 45|working full-time and part-time, major
  - Probability of working full-time, part-time|major
  - Probability of marriage|major
  - Spousal earnings|marriage=1, major

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- Also: Elicit perceived probability to graduate with a major in each field

Sample Questions

- If you received a Bachelor's degree in each of the following major categories and you were working FULL TIME when you are 30 years old what do you believe is the average amount that you would earn per year?

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- What do you believe is the percent chance of the following: (1) You are working full time; (2) You are working part time; (3) You are not working at all, when you are 30 years old if you are married and you received a Bachelor's degree in each of the following?

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- What do you believe is the percent chance (or chances out of 100) that you would either graduate from NYU with a major in the following major categories or that you would never graduate/drop-out (i.e., you will never receive a Bachelor's degree from NYU or any other university)?

Beliefs about own future earnings (in 10,000s Dollars)

	Age 22		Age 30		Age 45	
	Male	Female	Male	Female	Male	Female
Science/Business	5.9	5.4	13.7	10.9++	19.0	13.8+++
	(7.3)	(4.7)	(16.6)	(9.3)	(22.4)	(14.1)
Humanities	4.7	3.9	6.9	6.9	11.0	9.6
	(7.4)	(3.5)	(5.5)	(7.4)	(13.5)	(11.8)
Not Graduate	3.5	2.5++	5.1	3.3++	9.0	5.9+++
	(7.5)	(1.2)	(11.0)	(4.6)	(16.0)	(10.2)
Overall	5.6	4.7+	13.0	9.2+++	18.4	12.3+++
	(7.4)	(3.8)	(16.4)	(8.5)	(22.5)	(13.9)

Standard deviations in parentheses.

+++, ++, + gender diffs sig at the 1, 5, and 10% levels.

Resulting papers I: REStud 2015

- Focus on (causal) role of earnings expectations|major
  - ▸ Embedded information intervention: Population-level earnings|major; Re-elicit *self* beliefs and intended major choice
  - ▸ Panel → Exploit within-subject variation in beliefs and intentions

The following information is from the US Census Bureau.
Among all male college graduates aged 30 with major (M):

The percentage that are working full time is

Econ	Eng	Hum	Nat	No Grad
93.5%	91.6%	77.6%	81.9%	72.1%

The average annual earnings of those that are working full time is

Econ	Eng	Hum	Nat	No Grad
$74,542	$82,377	$52,937	$72,583	$47,803

% of those working full time that earn more than $35,000 per year is

Econ	Eng	Hum	Nat	No Grad
92.4%	95.2%	78.8%	90.6%	65.2%

% of those working full time that earn more than $85,000 per year is

Econ	Eng	Hum	Nat	No Grad
31.5%	33.6%	8.7%	24.2%	5.7%

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- [Other "successful" example of info on > 1 dimension: Bottan and Perez-Truglia (2022)]

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- Use structural model to quantify role of earnings beliefs, unobserved "taste", risk aversion Identification

Resulting papers II: JPE 2021

- Paper studies perceived (non-)monetary returns to different majors, and how beliefs correlate with actual major choice

- Subset of findings:
  - Individuals perceive marriage market return to graduating,
  - Female students perceive marriage market "penalty" to graduating in science or business
  - Perceived non-monetary returns explain substantial share of variation in major choice

- Follow-up survey six years later: Predictive validity of ex-ante expectations for realized outcomes
  - For similar exercises see Gong, Stinebrickner and Stinebrickner (2019) and Arcidiacono et al. (2017)

Related Literature

- Human capital investments and returns in the marriage market
  - Iyigun and Walsh (2007); Chiappori, Iyigun, and Weiss (2009); Chiappori, Salanie, and Weiss (2015)
  - Empirical work generally infers (ex post) returns indirectly: Ge (2011); Lafortune (2013); Attansaio and Kaufmann (2011); Kaufmann et al. (2015)

- Subjective expectations and human capital decision-making
  - Manski, 2004, has an earlier survey of this literature. Arcidiacono et al. (2012, 2015), Stinebrickner and Stinebrickner (2012, 2014), Zafar (2013), Giustinelli (2015), Kaufmann (2015), and Wiswall and Zafar (2015, 2016)

- Educational/Occupational choices and the gender gap
  - Turner and Bowen (1999); Arcidiacono (2004); Bertrand et al. (2010); Goldin and Katz (2011); Goldin (1997, 2014); Flabbi and Moro (2012); Gemici and Wiswall (2014); Klevin et al. (2015); Wasserman (2015); Bronson (2015)

Setting the Course for the Future – Expected Success Probabilities and School Track Choice at age 15

Pia Pinger, Sonja Settele, Helene Willadsen

Motivation

- Young individuals take far-reaching education choices based on limited information

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- They should solve their decision problem on which education to choose based on expected utility from different choices

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  - Payoff conditional on "success" (f.ex. graduation)
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- To date, we have limited evidence on the role of perceived success probabilities of adolescents

This project

- We sample Danish adolescents aged 15-16 who approach the end of primary school, and their parents.

- They are about to choose the next step in their education:
  - Leave school
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- We focus on choice to go for High School track and study beliefs
  - about high school success rates of past cohorts...
  - ...who are similar in terms of elementary school performance
  - ...who are also similar in terms of gender and parental education
  - about future own high school success|enrolling

- Important: We can compare subjective beliefs to objective benchmarks based on Danish register data.

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- We document beliefs and biases in beliefs by
  - Gender
  - Parental background

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- We document how beliefs about success rates correlate with school track choices

- We use an information provision experiment to study how beliefs about success rates affect
  - expected difficulty of high school and workload|high school
  - expected personal performance|high school
  - expected life satisfaction|high school
  - planned education choice

Related Literature

- Role of expectations for educational decision-making (Manski, 1993, 2004)
  - Earnings expectations affect educational decision-making but effect sizes are small (Zafar, 2013, Wiswall & Zafar, 2015, Belfield et al, 2020)

- Expectations about future success
  - are often overly optimistic (Zafar, 2011, Stinebrickner & Stinebrickner, 2012, Boneva et al., 2022)
  - vary by gender/SES (Zafar, 2013, Belfield et al., 2020, Boneva and Rauh, 2021)
  - relate to ability and past performance (Cowan, 2017, Belfield, 2020, Kunz & Staub, 2020)
  - are predictive of future drop-out decisions (Stinebrickner & Stinebrickner, 2012, Cowan, 2017))
  - tend to be similar between parents and children (Giustinelli, 2016)
  - are updated based on feedback/grades (Stinebrickner & Stinebrickner, 2012, 2014)

Data Innovation and Contribution

- Measure beliefs about well-defined quantitative measure of High School "success"|gender, SES, previous school performance
  - Compare to objective benchmarks, document (mis)perceptions

- Measure beliefs of adolescents *and* their parents (Mueller (WP 2022))

- Broadly representative sample of young individuals
  - We contact a large and fully representative subset of the population
  - Focus on *first* important track choice in Danish education system

- Contact adolescents *before* enrollment decision
  - Different from studies on e.g. dropout decisions (see e.g. Stinebrickner and Stinebrickner, 2012, Wiswall and Zafar, 2015 for college students)

- Causal evidence on how perceived Prob(Success) affects expectations of difficulty, effort, enjoyment and ultimately education choices

Experimental Design I: Survey Outline (Kids' survey)

- "Pre-Treatment" Items
  - Demographics
  - Which grade level? (Keep if last grade of primary school)
  - Family composition and parents' education
  - 9th grade school performance
  - Prior Beliefs about historical high school "success" rates

- Randomized Information Treatment: Objective historical high school "success" rates

- Post-Treatment Outcomes:
  - Difficulty of high school
  - Expected effort|high school
  - Enjoyment|high school
  - Intended school choice

Experimental Design II: Define Dimensions of Interest

We choose to focus on the following personal characteristics:

- Previous school grades: Highly predictive of later school success; use 9th grade math grade as proxy $\rightarrow$ 7 groups

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- Family Background/Parents' highest completed education: Role of education choices for social mobility
  - How to choose different groups by parental education?
  - Trade-off between homogeneity of groups and simplicity
  - Choose four levels of education: Primary school only, some education but no HS, HS but not academic, academic
  - Create combinations of these four levels

Beliefs about Prob(Success|gender, parents' educ., grades)

- Vi vil nu bede dig om at tænke på individer, som er ligesom dig i forhold til:

  - De fik karakteren **7 i matematik uden hjælpemidler/færdighedsregning** i slutningen af 9.klasse
  - De er **piger**, og
  - **Deres forældre har begge en erhvervsuddannelse, en kort eller en mellemlang videregående uddannelse, men har ikke en gymnasial uddannelse.**

  Tænk nu på alle individer med de karakteristika, som er cirka 6 år ældre end dig (født i år 2000), og som startede på en gymnasial uddannelse (STX, HHX, HTX) efter 9. eller 10. klasse.

  Hvad tror du: For hver 100 af de unge i denne gruppe, <u>hvor mange færdiggjorde en gymnasial uddannelse</u> inden for 3 år med et <u>gennemsnit på mindst 7</u>?

  Bemærk: Hvis dit svar afviger mindre end tre fra det sande tal baseret på data indsamlet af Børne- og Undervisningsministeriet, får du et lod til lotteriet om et et af 10 gavekort til en værdi af 750 kr. (Alle vindere får tilsendt deres gavekort i e-Boks.)
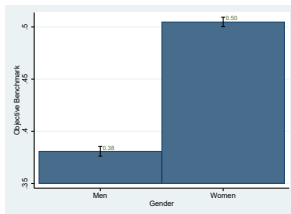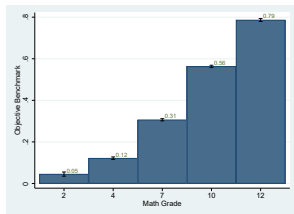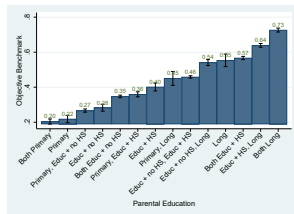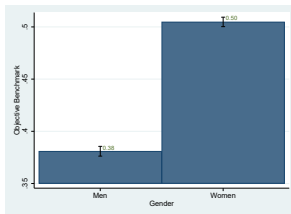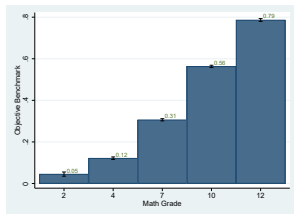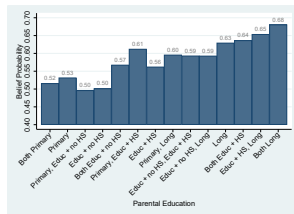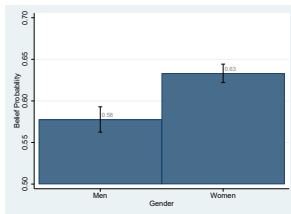
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Treatment

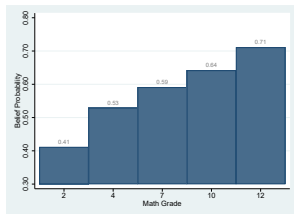# Preliminary Results: Objective and Perceived P(Success)

Probability(GPA>=7): Objective Benchmarks
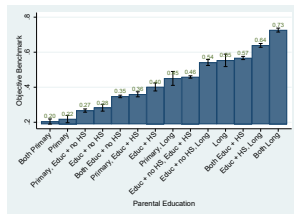
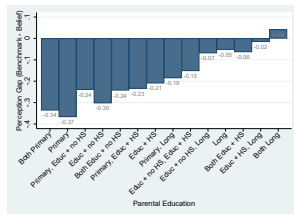# Preliminary Results: Objective and Perceived P(Success)

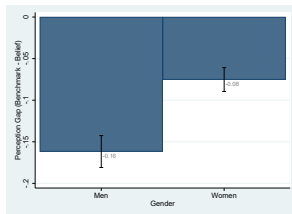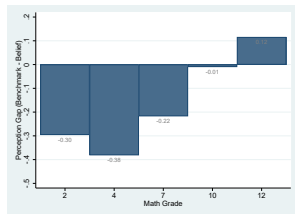## Probability(GPA>=7): Objective Benchmarks

Probability(GPA>=7): Subjective Beliefs

Preliminary Results: Perception Gaps

Outlook

- Link between perceived success probabilities and secondary educ. choice

- Perceived success probabilities and other expectations
  - Workload/Effort
  - Expected enjoyment of school and social life
  - Choice of A-level courses

- Determinants of parents' beliefs
  - Parent's gender, child's gender
  - Parent's own education and education of partner
  - Child's previous grades

- Link between parents' and children's belief

- Potentially: Follow-up survey after first feedback in high school

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  - School track choice at age 15: One early-stage project of mine

- **Occupation Choice**
  - Preferences over job characteristics and career choice: Paper by Basit Zafar and Matthew Wiswall (QJE 2018)
  - Early-stage project of mine: Brief sketch of idea and survey design

- Career vs. Parenting
  - Not covered, but let me know if you want to have a chat!

Understanding role of preferences over job attributes for job choice (and major choice)

Challenging to answer with observational data because:

- Observed choices may not reflect worker preferences only
    - if LM frictions prevent workers from matching with their preferred job
    - if firms discriminate against certain workers
- Can only evaluate the observable aspects of jobs.
    - estimates of job attribute preferences biased if unobserved characteristics correlated with observed ones
    - seems particularly important because of role of "tastes" Literature

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$\rightarrow$ Approach of Zafar and Wiswall (2018): Use vignettes/hypothetical scenarios which exogenously vary certain aspects of jobs, and ask college students for the likelihood of choosing particular jobs

- Study Design: 257 undergraduates at NYU, 90 min survey in lab

Choice Scenario

In each of the 8 scenarios below, you will be shown hypothetical jobs offers. Each job offer is characterized by:

A1

A2

A3

A4

These jobs are otherwise identical in all other aspects.

Look forward to when you are 30 years old. You have been offered each of these jobs, and now have to decide which one to choose.

In each scenario, you will be asked for the percent chance (or chances out of 100) of choosing each of the alternatives. The chance of each alternative should be a number between 0 and 100 and the chances given to the three alternatives should add up to 100.

[intro on the use of percentages]

Job choice: Example 1

- Respondents asked for the probability of choosing each job.
- Eight scenarios like the one below presented

	Earnings at age 30	% inc. earnings	Work hrs per week	Part-time available	Mean Prob Males	Females
Job 1	$96,000	3%	52	Yes		
Job 2	$95,000	2%	45	Yes		
Job 3	$89,000	4%	42	No		

Now consider the situation where you are given the jobs offered above when you are aged 30, and you have decided to accept one of these jobs. What is the percent chance (or chances out of 100) that you will choose each of these jobs?

Job choice: Example 1 (contd)

	Earnings at age 30	% inc. earnings	Work hrs per week	Part-time available	Mean Prob Males	Females
Job 1	$96,000	3%	52	Yes	31.9 (22.5)	31.5 (21.4)
Job 2	$95,000	2%	45	Yes	31.2 (23.7)	39.3*** (22.7)
Job 3	$89,000	4%	42	No	36.9 (24.7)	29.2*** (22.6)

WTP estimates

	Overall	Male	Female
Prob of being fired	2.83%***	0.62%	4.01%***+++
Bonus	-1.41%***	-0.85%*	-1.71%***
Proportion of males	0.06%	0.08%	0.04%
Annual raise at job	-1.56%	-3.38%**	-0.59%
Hrs/Week of work	1.13%***	0.78%	1.31%***
Part-time available	-5.13%***	-1.09%	-7.29%***++

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Women, on average, willing to give up higher earnings to obtain other (non-pecuniary) job attributes. Suggests part of gender gap in earnings is a compensating differential.

Method

Additional Findings

- Estimated preferences systematically linked with actual future workplace characteristics
- Job attributes play a role in major choice, with females being more sensitive to non-pecuniary job aspects in major choice
- The (expected) earnings gender gap would be at least a third smaller if there were no differences in workplace preferences- part of the earnings gender gap is a compensating differential

On the Method

- In my view reported preference approach is the gold standard for getting at preferences over different attributes
  - Abstract away from other confounds
  - Can trade off different "currencies", such as income against flexibility
  - Extensive variation in scenarios
  - More and more studies suggesting that meaningful responses when hypothetical scenarios are realistic and relevant
    - Mas and Pallais (2017): Similar valuation for alternative work arrangements in surveys and field experiment
    - Nicole Maestas et al.: WTP for job characteristics,
    - Parker and Souleles, 2017, Bunn et al. 2017: estimates similar to actual spending responses to past rebates/shocks
    - See also the recent review article "Experiments in Surveys" by Fuster and Zafar for a discussion of this method
  - Only downside: Survey space

Planned Field Experiment in Denmark

- Question: How do recent graduates choose their entry-level jobs, how do they target their job search?
- What beliefs do they hold about job amenities in different job categories?
- Are some groups better informed than others? (Role of family ties)
- What is causal role of perceived amenities for job choice?

- Planned survey with integrated information provision on
  - Typical earnings
  - Success rates of applications

- Joint with Asker Nygaard Christensen, Nikolaj Harmon, Daphne Skandalis

Appendix

Identification: Simple Example

- Pre-treatment log odds of majoring in degree k relative to degree $\tilde{k}$:

$$r_{k,i} = \gamma_{k,i} + \theta \bar{W}_{k,i} + \epsilon_{k,i}$$

  where $\bar{W}_{k,i} = \bar{w}_{k,i} - \bar{w}_{\tilde{k},i}$.
- $\epsilon_{k,i}$ represents unobserved elements of utility
- Post-treatment log odds of majoring in degree k relative to degree $\tilde{k}$:

$$r'_{k,i} = \gamma_{k,i} + \theta \bar{W}'_{k,i} + \epsilon'_{k,i}$$

  where $\bar{W}'_{k,i} = \bar{w}'_{k,i} - \bar{w}'_{\tilde{k},i}$.
- Difference in log odds of majoring in degree k (post minus pre-treatment stages):

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Identification: Simple Example

▶ The intuition for identification from the experiment comes from the following ratio (ignoring $\epsilon_{k,i}$ components):

$$\theta = \frac{r'_{k,i} - r_{k,i}}{\bar{W}'_{k,i} - \bar{W}_{k,i}}$$

▶ θ is large when there is a large change in probability of completing a degree ($r'_{k,i} - r_{k,i}$) relative to change in beliefs about earnings ($\bar{W}'_{k,i} - \bar{W}_{k,i}$).

▶ More formally, if the following moment condition holds, we can identify θ following standard fixed effects identification argument:

$$E[(\epsilon'_{k,i} - \epsilon_{k,i})(\bar{W}'_{k,i} - \bar{W}_{k,i})] = 0$$

Paper in a Nutshell

- Presents a structural model of major choice where each possible choice of major entails an expected post-graduation utility from stream of future consumption which depends on
  - own and partner's earnings|major in different states (married/single × working full-time/part-time)
  - times the probability of these states
- Major choice is the choice that maximizes the sum of
  - direct utility based on taste for different majors
  - expected post-graduation utility depending the above factors
- Question: How does intended choice respond to a change in expected earnings|major?
- Use panel of expectations and intended choice to abstract from taste for majors
- Findings:
  - Elasticity of choice based on within-subject variation $<$ based on cross-sectional variation in expected earnings (taste correlated with expectations)
  -

Innovation/Contribution

1. Directly elicit ex-ante treatment effects
   - Relax previous strong assumptions such as rational expectations

2. Provide population-level information and generate short-run panel
   - deal with omitted variables such as "taste" for different subjects, frictions
   - Quantify resulting upward-bias in cross-sectional estimates

3. Model and quantify role of uncertainty around conditional expectations
   - Estimate risk aversion parameter

Determinants of College Major Choice: Identification using an Information Experiment

Wiswall and Zafar, REStud, 2015.

Human Capital and Expectations about Career and Family

Wiswall and Zafar, JPE, 2021.

Motivation and Research Question

- Traditional view of human capital investments privilege monetary motivations ("career concerns")

- However, many other factors may be important, such as implications of human capital choices for future family life (marriage and fertility) and, of course, the pure enjoyment of working in particular fields or jobs

- Previous work has studied the trade-offs between career and family by examining the characteristics of already chosen education and jobs, e.g. women more likely than men to choose careers allowing greater hours flexibility

- Wiswall and Zafar (JPE 2021) study how individuals *perceive* the trade-off between career and family when they are young and are in the process of making key human capital decisions

Background

- Previous studies on major choice under uncertainty
  - Strong assumptions such as full information and rational expectations

- At odds with empirical patterns
  - Previous work has found considerable heterogeneity in beliefs about future earnings (Manski, 2004; Jensen, 2009; Zafar, 2013; Arcidiacono et al.,2012; Wiswall and Zafar, 2015)

  - Updating in response to info: Jensen (QJE, 2010), Bettinger et al. (QJE, 2012); Hoxby and Turner (2013); Bleemer and Zafar (JPubE, 2017)

Prior Belief about Success Rate|Grade

- I det her spørgsmål skal du tænke på en **lidt større gruppe** af unge:

  Nemlig, **alle unge** (både drenge og piger og med alle former for forældremæssig baggrund) i Danmark født i 2000 som fik **karakteren 7 i matematik uden hjælpemidler** (færdighedsregning) i slutningen af 9.klasse.

  Tænk nu på alle i denne gruppe, som startede på en gymnasial uddannelse (STX, HTX, HHX) efter 9. eller 10. klasse.

  Hvad tror du: For hver 100 af de unge i denne gruppe, hvor mange gennemførte en gymnasial uddannelse inden for tre år med et gennemsnit på 7 eller bedre?

  Bemærk: Hvis dit svar afviger mindre end tre fra det sande tal baseret på data indsamlet af Børne- og Undervisningsministeriet, får du et lod i lotteriet om et af 10 gavekort til en værdi af 750 kr. (Alle vindere får tilsendt deres gavekort i e-Boks.).

  Indtast dit svar under dette søljediagram.
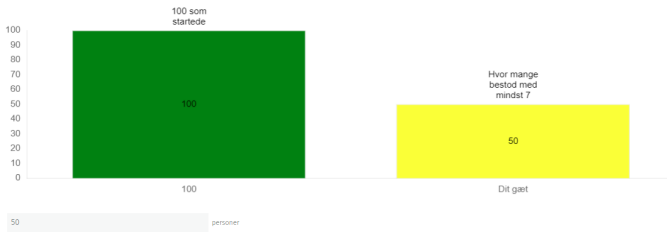
Exp. Design: Treatment

Måske er du nysgerrig efter at vide, **hvordan det gik unge** født i år 2000, med en 9.klasses standpunktskarakter på 7 i matematik uden hjælpemidler på den **gymnasiale uddannelse**?

Her er, hvad vi kan fortælle dig baseret på informationer indsamlet af Børne-og Undervisningsministeriet. Følg godt med, for vi viser dig kun denne information en enkelt gang.

Faktisk gik det sådan, at **31 ud af 100 personer** med ovenstående karakteristika som startede på en gymnasial uddannelse, gennemførte med et gennemsnit på 7 eller bedre, inden tre år.

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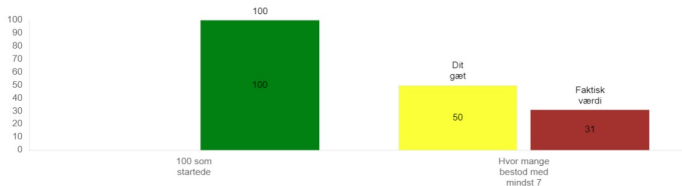
Literature Review: Compensating Differentials

- Theoretical framework for hedonic pricing: Rosen (1974; 1986).
- Mixed results: Thaler and Rosen, 1975; Gronberg and Reed, 1994; Van Ommeren et al., 2000; Stern, 2004; Dale-Olsen, 2006.
- Search frictions could imply small equilibrium wage differentials even if preferences for non-wage amenities are strong (Bonhomme and Jolivet, 2009; Hwang et al., 1992)
- Recent papers: Hall and Mueller (2015), Sorkin (2015), Taber and Vejlin (2016).

Literature review: College major choice and Gender

- Observables (such as ability, earnings expectations) play a small role in major choice (Arcidiacono et al., 2012; Wiswall and Zafar, 2015; Altonji et al., 2015)
  - ▶ choice elasticity with regards to earnings is small. Tastes are the dominant factor.

- Gender differences in major choice largely due to tastes or preferences for non-wage factors (Zafar, 2013; Wiswall and Zafar, 2015; Bronson, 2015)

- Complementarities between college majors and occupations (Arcidiacono et al., 2015)

Literature review: Gender differences in occupation choice

Various hypotheses:

- Gender differences in preferences for competition (Niederle and Vesterlund, 2007; Flory et al., 2015)
- Gender differences in workplace flexibility (Goldin and Katz, 2011; Flabbi and Moro, 2012; Goldin, 2014; Wasserman, 2015)
- Gender differences in risk preferences (Croson and Gneezy, 2009)
- Differences in tastes for certain occupations (Blau and Kahn, 2012)

Challenging to disentangle due to omitted variables (Blau and Kahn, 2006).

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Willingness to Pay

How much do students need to be compensated (as a percent of age 30 earnings) to increase the outcome by a unit?

Consider a change in the level of attribute X_k from value $X_k = x_k$ to $X_k = x_k + \Delta$, with $\Delta > 0$. Given our linear utility function, the indifference condition in terms of earnings Y is

$$x_k \beta_{ik} + \beta_{i1} \ln(Y) = \beta_{ik}(x_k + \Delta) + \beta_{i1} \ln(Y + \mathsf{WTP}_{ik}(\Delta))$$

Solving, WTP is given by

$$\mathsf{WTP}_{ik}(\Delta) = [\exp\left(\frac{-\beta_{ik}}{\beta_{i1}}\Delta\right) - 1] \times Y$$