Background, Beliefs and Economic Outcomes: How Family and Peers Relate to Beliefs, Early Pregnancy, Crime and Labor Market Outcomes

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Dedication

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Abstract

This dissertation consists of three chapters. The unifying theme of this thesis is how an adolescent's background is related to adolescent's beliefs about the future and how these beliefs are correlated with future outcomes. I then discuss what the policy implications are if beliefs with respect to ability or comparative advantage are biased.

The first chapter focuses on how beliefs are related to an adolescent's background using the NLSY97. Included in this chapter is an introduction to past work examining beliefs as well as a description of the dataset used for the remainder of the dissertation. The beliefs examined in this chapter are self reported beliefs of college enrollment, early parenthood, arrests, becoming a victim of violence, working more than part time, and likelihood of serving in the military.

The second chapter then focuses on how beliefs are related to later life outcomes. Outcomes examined in this chapter are arrests, early pregnancy, service in the military, bachelor's degree attainment, and working more than an average of 20 hours per week in 2010. I then conclude the chapter with a discussion on information frictions.

The third chapter picks up on the discussion of information frictions and explores an example, enrollment in college, of where beliefs about ability can be different from underlying ability. This chapter discusses the effect of these biases on inequality in bachelor's degree attainment and what the policy implications are of free college for all versus targeting subsidies and information to high ability youth from underrepresented backgrounds in higher education.

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Chapter 1

How are Peers and Parents Experiences Related to Beliefs about Future Outcomes?

1.1 Introduction

An adolescent's perception about the future can be influenced by the decisions and outcomes of parents and peers. For example youth from lower socioeconomic backgrounds can believe that positive outcomes like graduating college or working full time are less likely than youth from higher socioeconomic backgrounds. Likewise they may believe that negative outcomes like being a victim of violence, having an early pregnancy or being arrested are more likely than youth from higher socioeconomic backgrounds. This may be due to higher exposure to negative events and lower exposure to more positive events in the communities that lower socioeconomic status youth are raised in.

In this chapter I explore to what extent beliefs are correlated with the behavior of peers and the outcomes of parents. Specifically I will examine to what extent beliefs and peer-parent attributes concerning related outcomes are correlated. In this paper I examine beliefs related to participation in risky behavior: early pregnancy before age 20, arrests, and becoming a victim of violence. I will also examine beliefs related to labor market outcomes such as probability of enrolling in college, working full time, and likelihood of joining the military. The peer covariates that will be used are measures of peers that are members of clubs, members of gangs, have sex, and cut class. Parental outcome covariates include average parental education, parental incarceration history, parental military service, and mother's age at first birth. For this first analysis I will measure this relationship by the coefficient results from OLS regressions of beliefs on peer and parent attributes while controlling for demographics, geography, household net worth, cognitive ability and participation in risky behavior.

I find that parental education and peers college plans are strongly correlated with beliefs about going to college as well as working more than part time. Parental military service is also strongly correlated with likelihood of joining the military.

Finally peers involvement in adverse behavior like being in a gang or cutting class is strongly associated with the beliefs about outcomes associated with own adverse behavior such as arrests, becoming a parent at a young age, and being a victim violence.

After examining the relationship between beliefs and parent-peer attributes, I will then examine how much explained differences, or differences explained by differences in average covariate values, in average beliefs between youth from high net worth households compared to low and medium net worth household can be explained by mean differences in peer-parent attributes. I will perform this analysis using a Oaxaca-Blinder decomposition where I report the specific parent or peer attribute percent contribution of the explained gap in mean beliefs by socioeconomic background. The primary goal of both analyses is to examine if there is any evidence for social learning or imitation that may result in more pessimism regarding future outcomes for youth from lower socioeconomic backgrounds.

In the Oaxaca Blinder decomposition I find that high net worth individual's higher average parental education and number of peers with college plans explains as much as 46-56% of the total covariate explained higher average college beliefs of high net worth individuals versus low and medium net worth individuals. Additionally I find that high net worth individual's lower average percent of peers who cut class or were in gangs explains between 19-100% of the total explained lower self reported probability of being arrested or a victim of violence compared to low and mid net worth individuals. Finally for low net worth individuals, if peer measures were the same as those of high net worth individuals then the explained gap in becoming a parent young would decrease by 17%.

Together this suggests that there is some evidence of social learning, since parent and peer attributes that are closely related to beliefs are strongly positively correlated. Additionally they explain a significant portion of belief gaps. If social learning determines beliefs that effect future choices and outcomes, then the extent to which this social learning reflects actual human capital suggests an inefficiency in the market that could be corrected by providing individuals more salient signals about their ability. Both of these possibilities will be discussed in Chapters 2 and 3.

1.1.1 Contribution to the Literature

This paper is the first to analyze the relationship between peer-parent attributes and beliefs relating to not only labor market outcomes but beliefs related to risky behavior. Much of the literature that has examined the relationship between beliefs and adolescent socioeconomic background has focused solely on beliefs about education outcomes, academic ability and net returns to schooling.

For instance Streufort 2000, argues that since youth from lower income backgrounds are more exposed to lower income adults, they will underestimate the returns to college. Consistent with this theory Horn, Chen, and Chapman 2000, found that students from lower income backgrounds overestimate the costs of attending college, which leads to lower perceived returns to college. Similarly Bleemer and Zafar 2018, find that youth from lower income and non college backgrounds exhibit more bias in

the perceived net returns to college. These papers suggest that expectations about education can be effected by social environment. If that is the case then its plausible that expectations about other outcomes can be influenced by social environment or in this context peer-parent attributes as well.

In a paper that is most related to this one, a team of researchers found that youth who exhibited more victimization shocks including being homeless, witnessing a shooting, or being a victim to a violent crime are less likely to believe they will earn a degree by age 30 and more likely to believe they will experience negative shocks like death, pregnancy, or arrests. Additionally adverse family shocks like divorce, death, unemployment and hospitalization where also highly negatively correlated with degree attainment expectations, and positively correlated with self reported probabilities of experiencing negative shocks (Deluca, Papageorge, Boselovic, Gehrshenson, Gray, Nerenberg, Sausedo,and Young 2021).

This paper contributes to this literature by showing results that suggests adolescents expectations about the future may also be affected by peers-parent attributes. It provides further evidence that more pessimism among lower socioeconomic status youth is explained by different levels of exposure to positive and adverse social backgrounds. If these beliefs also affect the choices that adolescents make later in life, then understanding the social determinants of these beliefs may help policy makers identify populations that are more at risk and therefore good targets for information campaigns that improve beliefs and future decisions.

1.2 Data and Summary Statistics

This section discusses the data set and the main variables that will be used in the analysis. For further information for how the sample was selected and how variables were defined see appendix A.1.

The data set that I use to examine how peers and parents activities are related to individual beliefs is the 1997 wave of the National Longitudinal Study of Youth (NLSY97). The NLSY97 is a panel data set that follows individuals from 1997 to the present day and is designed to be representative of youth born in the continental United States between 1980-1984. The study also over samples African Americans and Hispanic Americans.

The main analysis of interests is first to use Ordinary Least Squares analysis to measure the effect of peers activities and parental outcomes on beliefs. Then the second analysis is to use a Oaxaca Blinder decomposition to measure how much OLS explained socioeconomic differences in beliefs are explained by differences in average peer and parent attributes by socioeconomic background. In this analysis socioeconomic status is measured by household net worth at the start of the survey.

The beliefs that I will use in this study are self reported probability about going to college in the future[1], self reported probability of working more than 20 hours in

[1]Since different year of birth cohorts were asked different questions this uses, probability of having a degree, probability of being enrolled in school next year, probability of being enrolled in school in five years

the future[2], likelihood on a scale of 1-5 of joining the military, self reported probability of having child within the next year, self reported probability of being arrested in the next year, and self reported probability of becoming a victim of violence next year[3]. All of the beliefs used in this study are beliefs recorded for survey years where agents were 18 or younger.

Peer measures used are respondent reports of percent of students in respondents grade that belonged to a gang, had college plans, had sex, cut class, and were members of sports, clubs or extracurricular activities. The peer variables are measured on a scale of 1-5 where each unit increase corresponds to approximately a 25 percent increase of peers with the reported characteristic. Parent outcome measures are average years of parents schooling, mother's age at first birth, and indicators for whether parents served in the military or were incarcerated.

In the analysis I control for cognitive human capital measured by ASVAB AFQT score, which is the respondent's percentile for their math and verbal test scores. I also control for participation in risky behavior, often used as a measure of non cognitive ability in othe papers (Hai & Heckman 2017) by using indicators for whether respondent's had sex by age 15, stole more than $50 by age 18, intentionally attacked or harmed someone by age 18.

I drop respondents who are missing data for all of the covariates with the exception of belief about college enrollment and likelihood of military service, since only a subset of respondents have this information available.I add a year of birth fixed effect for each analysis in order to control for the reporting of beliefs in different years or different versions of similar beliefs for different birth cohorts. I also keep respondents only if they identify as White Non Hispanic, Black of any ethnicity, and Hispanic since other racial/ethnic groups have very small sample sizes.

Summary Statistics for the sample are shown in Table 1.1. The bottom net worth tercile over samples women. The share of individuals that identify as Black or Hispanic declines with increasing household net worth terciles. The table shows that youth from a lower wealth tercile are on average more pessimistic about college enrollment and working more than part time. Youth from a lower wealth tercile also believe that they are more likely to have a child within a year, join the military, be a victim of violence, or be arrested.

Peer measures exhibit a similar trend, where more social attributes related to risky behavior are more common in lower net worth terciles and more positive attributes are less common in lower net worth terciles. For instance compared to youth from the top net worth tercile, youth from the lower net worth terciles have more peers who have had sex, who are involved in gangs, and cut class. They also have less peers with college plans and that are involved in extracurricular activities. Lower net worth tercile youth on average have parents with less years of schooling, younger mother's age at first birth, and a higher proportion of parents who have been incarcerated. They also have lower average measures of cognitive ability and a higher

[2]For cohort born before 1982, this is probability of working 20 plus hours at age 30, and for cohorts born in 1982 or later this is probability of working 20 plus hours in five years.

[3]With the exception of likelihood of joining the military, beliefs measured in 1997 are used for cohorts born before 1982, and for the other cohorts beliefs measured 2000 are used

fraction participate in risky behavior.

In summary youth from lower socioeconomic backgrounds not only have lower measures of human capital on average but have peer and parental backgrounds with less socially positive attributes and more socially negative attributes. In the next section I investigate to what extent peer and parental measures are correlated with beliefs while controlling for differences in human capital measures.

Table 1.1: Summary Statistics: Beliefs, Peer, and Parent Measurs by Net Worth

VARIABLES	All	Low Net Worth	Mid Net Worth	High Net Worth
Belief: Prob Enroll Coll	71.17	63.42	71.30	82.67
Belief: Prob Work 20+ Hrs in Future	93.64	92.09	93.82	95.78
Belief: Likelihood Join Military	2.196	2.339	2.176	2.032
Belief: Prob Arrested Next Year	10.07	11.93	9.469	7.973
Belief: Prob Victim Violence Next Year	13.25	14.91	12.74	11.35
Belief: Prob Parent Next Year	6.882	9.088	6.667	3.778
Avg Years of Parents Schooling	12.54	11.54	12.52	14.10
Parent Ever in Jail	0.0668	0.111	0.0495	0.0209
Parent Serve in Military	0.252	0.219	0.270	0.281
Mom's Age at First Birth	22.69	21.27	22.36	25.26
HH Net Worth ($1000s)	139.5	9.578	105.2	381.1
Pct Peers had Sex	0.211	0.222	0.226	0.174
Pct Peers in Gang	0.177	0.228	0.170	0.108
Pct Peers College Plans	0.635	0.588	0.634	0.708
Pct Peers in Clubs/Sports	0.664	0.646	0.663	0.694
Pct Peers Cut Class	0.363	0.402	0.360	0.306
ASVAB AFQT (Pctile Math/Verbal Tests)	45.84	33.21	45.55	65.53
Ever Stole $50+ by age 18	0.139	0.158	0.137	0.112
Ever Attack/harm Someone by age 18	0.301	0.371	0.311	0.181
Ever had Sex by age 15	0.370	0.471	0.380	0.204
Female	0.520	0.559	0.489	0.497
Hispanic	0.205	0.292	0.198	0.0803
Black	0.273	0.399	0.276	0.0782
Sample Size	4,702	1,903	1,554	1,245

1.3 Analysis

In this section I first examine in section 1.3.1 the correlation between peers and parent characteristics with beliefs about school, education, military service, becoming a parent at a young age, being arrested, or becoming a victim of violence. I report these correlations through the coefficients obtained from ordinary least squares regressions

Then I examine in section 1.3.2 to what extent differences in average peer and parental characteristics by household net worth tercile can explain OLS predicted socioeconomic gaps in beliefs as shown in the summary statistics in Table 1.1. In this section these results will be reported using a Oaxaca Blinder decomposition. Specifically the covariate percent of the explained gap is reported.

Of specific interest is a social learning or social modeling mechanism, which, proposes that agents gain information from peers and important adults in their lives about what activities they have a competitive advantage in or more relative ability in. This will be captured by the coefficient for attributes of peers and parents that are closely related to the belief in question, such as beliefs about college enrollment and parental education and peers with college plans, or beliefs about being arrested and parental incarceration history and peers who cut class or are in gangs.

1.3.1 Multivariate Regression Analysis: Beliefs, Peers, and Parents

In this section we explore to what extent peer and parent attributes are associated with beliefs about future work hours, college enrollment, arrests, pregnancy at young ages, and becoming a victim of violence. The results are presented through regression covariates using Ordinary Least Squares of a model for each belief j as given below.

$$Belief_{i,j} = \vec{\gamma_{par,j}} \vec{Parent_i} + \vec{\gamma_{peer,j}} \vec{Peer_i} + \vec{\beta} \vec{X_{i,j}} + \vec{\varepsilon_{i,j}} \tag{1.1}$$

In equation 1.1 above, the subscript i represents the individual respondent to the Survey. The vector $\vec{Parent_i}$ is the vector of parents outcomes including average years of schooling, mother's age at first birth, and indicators for if parents had ever been incarcerated or served in the military. The vector $\vec{Peer_i}$ is the vector of covariates for percent of peers engaged in different behavior including plans for college, cutting class, involvement in sports/clubs, or in gangs. Additionally X_i is a vector of controls including household net worth, cognitive ability, participation in risky behavior, census region at the start of the survey, urban rural status at the start of the survey, sex, race and ethnicity. The parameters of interest are $\gamma_{par,j}$ and $\gamma_{peer,j}$ which represents the relationship between peers and parents attributes to beliefs.

What is of specific interest in this paper are the coefficients for parent and peer attributes that are most related to beliefs. For example, when regressing beliefs about college degree, what is of utmost importance are the coefficients on average years of parent's schooling and peers who plan to go to college. Similarly when regressing probability of arrest or victim of violence, what is of utmost interest is the coefficient on parental incarceration history and percent of peers in gangs or who cut class. This

is because risky behavior and crime are likely correlated with arrest and becoming victims of violence.

The results for college, work hours, and military beliefs are shown in Table 1.2. Table 1.2 shows that human capital measures are strongly correlated with belief measures. Where higher measures of cognitive ability and lower participation in risky behavior are associated with higher likelihoods of going to college and lower likelihoods of joining the military. For probability of working more than 20 hours there is a positive relationship with cognitive human capital through ASVAB AFQT.

Table 1.2 shows that for beliefs about the military and going to college, parents having similar experiences is associated with a higher reported likelihood. For instance column 1 shows that holding all else constant a one year increase in average parents years of schooling is associated with a 2.12 percentage point increase in self reported probability of going to college. This amount is similar to a 8.3 percentile increase in ASVAB AFQT or nearly $288,000 increase in household net worth. Similarly having parents who served in the military is associated with ranking the likelihood of joining the military 0.15 points higher on the 1-5 likelihood scale. This is roughly the same as 43 percentile point drop on the ASVAB AFQT or 11 year decrease in mother's age at first birth.

Additionally for beliefs about going to college similar peer plans is also strongly correlated with beliefs. For instance holding all else equal if percentage of peers with college plans increases by 25 percentage points then self reported probability of going to college increases by about 4.5 percentage points which is close to a 17 percentile increase in ASVAB AFQT.

Percent of peers with college plans and average years of parents schooling is also strongly positively correlated with self reported probability of working more than 20 hours. Mother's age at first birth is also positively correlated with probability of enrolling in college and negatively correlated with likelihood of joining the military.

Table 1.2: OLS Results: Beliefs about School and Labor Market

VARIABLES	(1) Prob Enroll Coll	(2) Prob Work 20+ Hrs	(3) Likelihood Military
Avg Years of Parents Schooling	2.1225***	0.2802**	-0.0208*
	(0.2695)	(0.1389)	(0.0112)
Parent Ever in Jail	-4.1354*	-0.2917	0.0797
	(2.1924)	(1.1686)	(0.0899)
Parent Serve in Military	-0.0145	0.4520	0.1496***
	(1.0815)	(0.5031)	(0.0455)
Mom's Age at First Birth	0.2767**	0.0737	-0.0137***
	(0.1091)	(0.0605)	(0.0046)
% Peers Coll Plan ($\sim$ 25 ppts)	4.4594***	0.8037***	0.0041
	(0.5228)	(0.2856)	(0.0212)
% Peers Cut Class ($\sim$ 25 ppts)	-0.7229	0.1863	0.0074
	(0.4534)	(0.2180)	(0.0185)
% Peers Club/Sports ($\sim$ 25 ppts)	0.6083	-0.0120	0.0155
	(0.5107)	(0.2635)	(0.0202)
% Peers in Gang ($\sim$ 25 ppts)	0.2199	-0.5441	0.0329
	(0.6398)	(0.3352)	(0.0255)
ASVAB AFQT (10 percentiles)	2.5655***	0.7581***	-0.0347***
	(0.2074)	(0.1114)	(0.0087)
Ever Stole $50+ by age 18	-4.5498***	-0.7274	0.0205
	(1.6153)	(0.8229)	(0.0622)
Ever Attack Someone by age 18	-4.0493***	0.7044	0.1944***
	(1.1894)	(0.5846)	(0.0486)
Ever had Sex by age 15	-4.8054***	0.9772*	0.0499
	(1.1474)	(0.5774)	(0.0466)
HH Net Worth ($10,000s)	0.0737***	-0.0201	-0.0015
	(0.0247)	(0.0139)	(0.0010)
Observations	4,172	4,702	4,018
R-squared	0.2489	0.0383	0.0733
Census Region & Urban Rural	Yes	Yes	Yes
Year of Birth Fixed Effect	Yes	Yes	Yes
Race, Ethnicity, Gender	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.3: OLS Results: Beliefs about Adverse Events, Early Pregnancy

VARIABLES	(1) Prob Victim	(2) Prob Arrest NY	(3) Prob Parent NY	(4) Prob Parent NY
Avg Years of Parents Schooling	-0.0908	0.1596	-0.1212	-0.1582
	(0.1733)	(0.1452)	(0.1398)	(0.2096)
Parent Ever in Jail	1.8175	2.3917*	2.0023	2.0749
	(1.3289)	(1.2722)	(1.2632)	(1.9557)
Parent Serve in Military	0.0669	0.3959	-0.2839	0.0852
	(0.6541)	(0.5841)	(0.5154)	(0.8121)
Mom's Age at First Birth	-0.0544	-0.0522	-0.0810	-0.1335
	(0.0664)	(0.0600)	(0.0549)	(0.0841)
% Peers Coll Plan (∼ 25 ppts)	-0.0754	-0.2675	-0.1264	-0.0924
	(0.3048)	(0.2725)	(0.2662)	(0.4278)
% Peers Cut Class (∼ 25 ppts)	1.0273***	0.8825***	0.4485*	0.3756
	(0.2771)	(0.2361)	(0.2430)	(0.3656)
% Peers Clubs Sports (∼ 25 ppts)	-0.7796**	-0.2447	-0.4251	-0.1213
	(0.3041)	(0.2652)	(0.2767)	(0.4117)
% Peers in Gang (∼ 25 ppts)	0.9426**	0.9385***	1.1489***	1.3210**
	(0.3872)	(0.3458)	(0.3699)	(0.5439)
% Peers had Sex (∼ 25 ppts)				0.2317
				(0.4222)
ASVAB AFQT (10 percentiles)	0.8050***	-0.1415	-0.3452***	-0.4522***
	(0.1241)	(0.1072)	(0.1001)	(0.1664)
Ever Stole $50+ by age 18	4.2289***	6.9152***	3.4724***	3.7959***
	(1.0287)	(1.0243)	(0.9330)	(1.4613)
Ever Attack Someone by age 18	3.9065***	3.6865***	2.3279***	3.0223***
	(0.7345)	(0.6351)	(0.6348)	(1.0385)
Ever had Sex by age 15	2.4250***	3.5360***	5.7168***	5.1619***
	(0.6799)	(0.5933)	(0.5777)	(0.9358)
HH Net Worth ($10,000s)	-0.0424***	0.0004	0.0075	0.0296
	(0.0156)	(0.0145)	(0.0107)	(0.0195)
Observations	4,702	4,702	4,702	2,094
R-squared	0.0581	0.1216	0.1177	0.1231
Census Region & Urban Rural	Yes	Yes	Yes	Yes
Year of Birth Fixed Effect	Yes	Yes	Yes	Yes
Gender, Race, Ethnicity	Yes	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 1.3 shows the results for beliefs about early pregnancy and adverse events like arrest or becoming a victim of violence. Table 1.3 has two specifications for probability of being a parent next year. One that does include percent of peers who have had sex, which was non missing only for the cohort born before 1982, and another specification that drops percent of peers who have had sex to include the whole sample. Contrary to Table 1.1 these measures of beliefs are negatively correlated with cognitive ability and positively correlated with participation in risky behavior.

Some similar patterns emerge in Table 1.3 as in Table 1.2. There is some evidence of social learning since parental incarceration history is marginally positively correlated with self reported probability of arrest. However mother's age at first birth does not have a statistically significant effect on probability of being a parent within the next year, which is at a young age for these respondents. More peers involved in adverse behavior like cutting class and being in a gang are positively associated with self reported beliefs of being a victim of violence, arrested in the next year or being a parent young. Interestingly the number of peers who had sex is not statistically significant for probability of being a parent next year.

In summary there is some evidence of social learning or modeling, where more educated parents and more peers with college plans is associated with more optimism about obtaining a degree. To the extent that higher education is correlated with higher likelihood of working more than part time, then this holds for self reported probability of working more than 20 hours a week. Additionally parents with a military history and incarceration history are positively associated with joining the military and probability of being arrested respectively. Similarly more peers involved in more risky behavior is also associated with higher self reported likelihoods of becoming a parent within the next year or experiencing a negative event like becoming a victim of violence or being arrested. These relationships hold even when controlling for household net worth, gender, race, ethnicity, and human capital measures.

In the next section I examine to what extent differences in peer and parent measures explain differences in beliefs by household net worth tercile. Where youth from lower socioeconomic backgrounds exhibit more pessimism regarding positive social outcomes like education and working more than part time and on average believe outcomes associated with risky behavior like early pregnancy and negative events are more likely.

1.3.2 Oaxaca Blinder Decomposition: What Explains Belief Gaps

In this subsection I focus on gaps in beliefs by household net worth. Specifically I will use a Oaxaca Blinder decomposition to estimate how much household net worth group differences in beliefs can be explained by group differences in average parent and peer attributes.

The Oaxaca Blinder decomposition is designed to decompose differences in group averages by an explained portion which is differences attributable to differences

in covariate averages, and an unexplained portion which is attributable to differences in the coefficients on covariates from OLS regressions carried out separately by group (Oaxaca, 1973; Blinder, 1973). The unexplained portion on certain covariates like race and sex have often been interpreted as evidence of direct discrimination in past research.

In this paper I will focus only on the explained portion, since the main question of interest concerns how similar outcomes and experiences by peers and adults affect beliefs. This paper will not attempt to provide a measure of discrimination even though minorities are overrepresented in the bottom wealth tercile. It is important to point out that discrimination in housing, schooling and law enforcement may lead to different covariate averages in parent and peer outcomes. In this case discrimination may play an important role in the explained portion. More explicit analysis on discrimination will be left for future work to explore.

It is also important to note that there may be differences in social learning by group. For instance if individuals from higher net worth households have more information about their abilities they may rely less on peer or parents outcomes as evidence of their ability than youth from a lower net worth household. This type of difference would be expressed through the unexplained portion of the Oaxaca Blinder decomposition. In this paper I am most concerned with any evidence for social learning at all not just by any one group. For this reason I will only present percent explained by covariates without discussing the unexplained portion. However in the raw output of the Oaxaca Blinder decomposition as seen in Appendix A.2.1 there appears to be little evidence of an important role in unexplained differences in peer and parent measures. For more information on the specific components of the unexplained portion relating to peer and parent covariates see the Oaxaca Blinder output in Appendix A.2.1.

Table 1.4 and 1.5 show the results of the Oaxaca Blinder decomposition only for the explained portion of the analysis. The reference group for the Oaxaca Blinder decomposition is individuals from high net worth families. The results shown in Tables 1.4 and 1.5 are the covariate specific explained portion divided by total explained portion. This provides a measure of how much of the total mean covariate explained difference in beliefs can be attributed to differences in the group means of the covariate in question. Hypothesis tests for whether the statistic is statistically different from zero where conducted only on the individual specific portions, total difference, and total explained.

Compared to low and mid net worth individuals, individuals from high net worth households are more optimistic about going to college, working more than 20 hours in the future, and believe they are less likely to join the military. Table 1.4 shows the percent explained by mean differences in parent and peer covariates for these three subjective beliefs. In Table 4 differences in average parents years of schooling and the number of peers with college plans can explain a significant portion of the explained difference in beliefs about college enrollment. The pct of the gap explained by the difference in these two covariates ranges from 46% for mid net worth individuals to 57% low net worth individuals.

For beliefs about working more than 20 hours in the future, only for mid net

worth individuals is there any highly significant portion that can be explained by differences in peer or parent covariates. For this group, it is only mean differences in peers with college plans that can contributes a statistically significant portion of the explained gap in belief of working more than 20 hours with respect to high net worth individuals.

For beliefs about military service, only mean differences in mother's age of birth explain an important portion of the gap between low and mid net worth individuals versus high net worth individuals. Mean differences in mother's age at first birth explain 14.7% of the explained gap for mid net worth vs high net worth individuals, and 17.1% of the explained gap for low net worth vs high net worth individuals. The negative percent explained for parents military service for the low versus high net worth individuals in this table means that higher net worth individuals believe they are less likely to join the military on average despite the fact that higher net worth individuals have more parents on average with a military history and despite the significant positive effect of parents military service on military beliefs.

Table 1.5 shows the percent explained for net worth gaps in beliefs about arrest, becoming a victim of violence, and becoming a parent within the next year. Individuals from high net worth households on average believe they are less likely to be arrested, become a victim of violence or become a parent in the next year. Table 1.5 shows that for almost every belief a significant portion of the gap in beliefs can be explained by differences in adverse behavior of peers, ranging from 17.3% of the explained gap to almost 100% of the explained gap, with the exception being gaps in beliefs of becoming a parent between mid and high net worth individuals.

Differences in parent outcomes play a much less important role for these beliefs than the college, military and work hour beliefs in Table 1.4. The exception is mother's age at first birth which explains a significant 47% for mid versus high net worth explained differences in arrest beliefs, and a marginally significant 11% for mid versus high explained differences in probability of becoming a parent in the next year.

In summary Table 1.4 and Table 1.5 show that differences in peer and parent attributes can explain gaps in beliefs about school, work, military service, arrests, becoming a victim of violence, and becoming a parent at a young age. Importantly, more peers with college plans, and higher parental education can explain a significant amount of the increased optimism of going to college for high net worth individuals versus low and mid net worth individuals. Additionally having more peers engaged in adverse behavior like cutting class or joining gangs can explain a significant portion of the increased belief of outcomes like becoming a parent young or adverse outcomes like being arrested, or a victim of violence.

Table 1.4: Pct Explained Mean Difference: College, Military, Work Beliefs

Beliefs	College	College	Work 20+ hrs	Work 20+ hrs	Military	Military
Net Worth	Low	Mid	Low	Mid	Low	Mid
Pct of Explained Difference						
All Parent Covariates	47.28	44.12	32.46	50.24	30.79	25.72
Avg Yrs Parents School	39.7***	34.25***	13.82	34.15	16.17	10.52
Parent in Jail	3.86**	0.3	2.01	-2.48	1.61	0.57
Parent Serve Military	0.22	-0.04	2.51*	0.15	-4.08**	-0.07
Mom's Age First Birth	3.5	9.61**	14.12	18.42	17.1**	14.7**
All Peer Covariates	18.75	16.23	23.95	34.35	2.54	5.15
% Peers Coll Plan	17.14***	11.94**	9.51	24.55***	-0.86	-0.25
% Peers Cut Class	1.5	1.49	-0.44	-5.49	1.15	1.07
% Peers Club/Sports	0.49	1.9*	2.42	5.6	-1.65	-1.32
% Peers in Gang	-0.38	0.9	12.46	9.69	3.9	5.65
Total Mean Belief Difference	19.27***	11.33***	3.7***	1.86***	0.3***	0.14***
Total Mean Difference Explained	13.45***	9.54***	3.04***	1.22**	0.28***	0.22***
Total Percent Explained	69.8	84.2	82.2	65.6	93.3	157.1

Note: Reference group is high household net worth tercile individuals while comparison groups are low and mid terciles. Hypothesis tests if explained portion equals zero, statistics are covariate explained portion divided by total explained
*** p<0.01, ** p<0.05, * p<0.1

Table 1.5: Pct Explained Mean Difference: Arrest, Victim, Pregnant Beliefs

Beliefs	Arrest NY	Arrest NY	Victim NY	Victim NY	Parent NY	Parent NY
Net Worth Tercile	Low	Mid	Low	Mid	Low	Mid
Pct of Explained Difference						
All Parent Covariates	-14.24	13.25	48.98	83.68	20.04	8.31
Avg Yrs Parents School	-21.12	-31.20	4.88	48.12	13.88	-5.26
Parent Jail	10.26*	-1.57	13.31	7.83	2.47	1.75
Parent Military	0.11	-0.97	0.0	-0.68	0.512	0.05
Mom's Age First Birth	-3.49	47**	30.80	28.41	3.18	11.77*
All Peer Covariates	50.85	25.42	92.09	135.44	18.82	15.75
% Peers Coll Plan	7.41	-3.85	12	-42.03	-0.33	3.81
% Peers Cut Class	16.98***	18.6**	35.22***	66.34**	5.28**	4.26
% Peers Club/Sports	0.11	5.99	5.2	46.94**	1.85	0.41
% Peers in Gang	26.35***	4.7	39.66**	64.19	12.03***	7.27
Total Mean Belief Difference	3.99***	2.01***	3.55***	1.42***	5.29***	2.91***
Total Mean Difference Explained	2.52***	0.98	1.47	0.32	5.94***	2.36***
Total Pct Explained	63.2	48.8	41.4	22.5	112.3	81.1

Note: Reference group is high household net worth tercile individuals while comparison groups are low and mid terciles. Hypothesis tests if explained portion equals zero, statistics are covariate explained portion divided by total explained
*** p<0.01, ** p<0.05, * p<0.1

1.4 Conclusion

In this chapter I showed that parent and peer attributes are strongly correlated with self reported beliefs about future outcomes, even when controlling for human capital, household net worth, and demographics. More importantly the pattern in which these beliefs are correlated with parental and peer attributes is consistent with social learning or social role modeling. In this context this would be individuals choosing to imitate the choices of their peers and parents, perhaps under the belief that these attributes provide a signal for what the individual has a comparative advantage in or would gain the most utility from.

Specifically, we see that average years of parental education and peers with college plans are strongly positively correlated with beliefs about going to college and working more than 20 hours in the future. Parental Military service is strongly positively correlated with likelihood of military service. Finally the amount of peers who participate in adverse behavior like cutting class and joining gangs is also strongly correlated with beliefs concerning outcomes that result from individual adverse behavior like becoming a victim of violence in the next year, being arrested within the next year or becoming a parent within the next year.

Additionally we see that there are differences in average beliefs by household net worth tercile, where individuals from more affluent outcomes believe positive outcomes like working more than part time and having a college degree are more likely. Individuals from less affluent backgrounds believe on average that being a parent at a young age, or negative outcomes like becoming a victim of violence is more likely. Using a Oaxaca Blinder decomposition, I showed that these differences in beliefs can be explained by youth from more affluent backgrounds having parents that on average have more years of schooling, have mother's who on average were older at first birth, more peers with plans to go to college, and less peers who cut class and participate in gangs.

If these beliefs are strongly correlated with future decisions, then this suggests that there can be inefficiencies in economic decisions. If these beliefs do affect future outcomes, then it can be possible that an individual with high levels of human capital who has a comparative advantage in attending college, may be less likely to go to college and more likely to engage in risky behavior, just because they come from a lower socioeconomic background where peer and parent attributes are different and provide different signals for what the choices the individual should make. In the next chapter I will explore how beliefs are correlated with future outcomes, to see if there is evidence of these inefficiencies in future economic decisions.

Chapter 2

How do Beliefs about Future Outcomes relate to Actual Outcomes?

2.1 Introduction

How well do beliefs of adolescents correspond to future outcomes and the future choices they make. In Chapter 1 I showed that beliefs about future outcomes are highly correlated with peer and parent attributes even when controlling for measures of household net worth, demographic background, cognitive ability measures and participation in risky behavior. Specifically I found that if we compare two otherwise identical individuals but one has parents with lower average years of schooling and less peers with college plans then they are less likely to believe they will go to college. Similarly if we compare two otherwise identical youth, but one goes to a school where more of their peers are in a gang or cut class then they are more likely to believe that they will be arrested or become a parent next year.

If beliefs at young ages have little relation to actual outcomes or choices agents make then these correlations may not be important. However if they do predict outcomes or choices then this suggests that there could be inefficiencies caused by information frictions. This is especially the case if there is no additional ability correlated with peer and parent measures in addition to traditional human capital measures like cognitive test scores and participation in risky behavior. Since agent's from lower socioeconomic backgrounds on average have parents with lower levels of education, mother's who gave birth at younger ages, less peers with college plans, and more peers that cut class and participate in gangs then this suggests that inequality in higher education, hours worked, arrests, incarceration and becoming a parent at young ages can be a result of information frictions. These information frictions may be a result of learning from one's environment, where one places relatively too much weight on parent and peer attributes and too little weight on actual measures of ability.

In this chapter I first ask what is the relationship between adolescents self

reported beliefs and future outcomes. I answer this question by estimating linear probability models using Ordinary Least Squares regression and reporting the coefficients of different beliefs on outcomes of interest. The beliefs that I will examine are likelihood of joining the military and self reported probabilities of going to college, working more than 20 hours in the future, being a victim of violence next year, being arrested next year, and becoming a parent next year. The outcomes that I will investigate are bachelor's degree attainment, working more than 20 hours on average a week in 2010, serving in the military, ever arrested, ever incarcerated, and ever a parent before age 20.

I then examine to what extent do high net worth individual's higher average self reported probabilities of going to college and working more than 20 hours a week, as well as lower self reported probabilities of being arrested, being a victim of violence, being a parent, and joining the military contribute to mean covariate explained differences in the outcomes of interest. I do this by performing a Oaxaca Blinder decomposition and reporting individual belief contributing percent of the explained gap, or total difference in outcomes due to differences in mean covariate values.

In this analysis I find that higher explained Bachelor's attainment rates, rates of working more than 20 hours a week in 2010, as well lower explained arrests rates relative to both mid and low household net worth individuals can be explained by differences in mean beliefs. This is especially the case for beliefs that correspond to outcomes. For example differences in mean belief of going to college explains 10.8-12% of the total explained bachelor's attainment gaps. I find that differences in mean belief of being arrested predicts between 4.6 to 5.5% of the total explained arrest history gaps. I also find that high net worth individuals lower average self reported beliefs about being a parent and lower average likelihood of joining the military explain 4.9 and 24.2 % of the explained difference in being a parent by age 20, and military service rates respectively.

In all, along with the findings in Chapter 1 this suggests that differences in an individuals background that are related to socioeconomic status are highly correlated with beliefs which in turn are highly correlated with future outcomes and inequality in these outcomes. This suggests that there may be information frictions brought about by social learning that lead to suboptimal choices later in life.

2.1.1 Contribution to the Literature

Much of the literature to this point has focused on the relationship between subjective beliefs about education outcomes or returns to schooling and actual education outcomes. For instance Wiswall and Zafar 2015 showed that beliefs about economic returns to different majors are related to major choice. Reuben, Wiswall, and Zafar 2015 show that overconfidence of male versus female college students explains increased earnings expectations of male students relative to female students and these earnings expectations are related to major choice and hence inequality in major choice. Stinebrickner and Stinebrickner 2014, also showed that differences in beliefs about college ability can explain up to 45% of college dropout at Berea College.

In contrast to most of the literature, this paper investigates more than just beliefs related to higher education. In this way, this paper is similar to Deluca, Papageorge, Boselovic, Gehrshenson, Gray, Nerenberg, Sausedo,and Young 2021, discussed in Chapter 1, where the authors found that beliefs about having a degree are highly correlated with graduating from college and type of college attended, while controlling for beliefs related to outcomes associated with risky behavior, demographics, household income, and measures of human capital. However, in contrast to this paper and the rest of the literature I investigate more than just college graduation. I also examine how these beliefs are related to other outcomes like hours worked, military service, pregnancy, arrests, and incarceration. Additionally this paper also explicitly investigates how mean differences in these beliefs can explain socioeconomic inequality in these outcomes.

Conceptually this paper also draws a lot from the theory of teenager time use proposed and investigated in Lochner 2004, and Lochner and Moretti 2004. Specifically these papers show that academic ability and time spent on schooling activities (even exogenously through compulsory schooling laws) have a negative relationship on contemporaneous participation in crime. The reason being that higher academic ability and more schooling leads to higher labor market earnings through increased human capital production. This makes the opportunity costs higher of participating in activities like crime that have immediate payoffs but future risks of labor market penalties such as incarceration were earnings are foregone while in prison. Although these papers were assuming agent's had rational expectation in the sense that they knew their ability and returns to time spent in different activities given abilities, the main findings still apply if agent's make these decision with subjective beliefs about ability and returns even if these are incorrect.

In relation to this paper, if agents form subjective beliefs from their environment about their ability as well as the future benefits relating to school, work, crime and sex, then these subjective beliefs should reflect the time investments individuals make. According to Lochner's framework agent's who believe they have higher levels of academic ability will believe they are more likely to go to college since they plan to invest more in schooling. Because of this they will believe they will have higher returns to schooling. Because of this they will be less inclined to participate in crime or sex at young ages because in the event of an arrest, incarceration, or becoming a parent they will face a higher opportunity cost of foregone earnings from school. Therefore they will believe that these outcomes will be less likely.

If this relationship is correct and these self reported beliefs in the NLSY97 reflect subjective beliefs about ability, then we should expect to see that beliefs about going to college are positively correlated with bachelor's attainment, and negatively related to arrests, incarceration and being a parent at young ages. Likewise agent's who believe that academic ability or academic returns are lower for them will see risky behavior like crime or sex as more appealing. Because of this they will believe their participation in these activities will be higher and therefore believe that arrests or early parenthood are more likely than youth who see risky activities as less appealing. In the analysis that follows we do find evidence consistent with this framework. To the extent that the military relates to this concerns the relative trade offs between

time spent in the military, in school, in the labor force or involved in risky behavior.

2.2 Data and Summary Statistics

This section discusses the data set and the main variables that will be used in the analysis. For further information for how the sample was selected and how variables were defined see appendix A.1.

Just as in Chapter 1 I use the 1997 wave of the National Longitudinal Study of Youth (NLSY97) for the analysis. In this chapter the analysis of interests is first to investigate the relationship between subjective beliefs and later life outcomes using Multivariate regression analysis. After the initial OLS estimates I use a Oaxaca Blinder decomposition to measure how much differences in household net worth tercile average beliefs can explain household net worth tercile differences in later life outcomes.

Just as in Chapter 1 the beliefs that I will use are self reported probability about going to college in the future, self reported probability of working more than 20 hours in the future, likelihood on a scale of 1-5 of joining the military, self reported probability of becoming a parent within the next year, self reported probability of being arrested in the next year, and self reported probability of being a victim of violence next year. All of the beliefs were recorded during survey years where agents were 18 years or younger.

The future outcomes considered in this study are indicators for whether the individual has a bachelor's degree, worked more than a weekly average of 20 hours per week[1], ever served in the armed forces, become a parent by age 20, ever been arrested during the survey period, or ever been incarcerated during the survey period.

In the analysis I control for cognitive human capital measured by ASVAB AFQT score, which is the respondent's percentile for their math and verbal scores for the ASVAB battery of exams. I also control for participation in risky behavior or non cognitive ability by using indicators for whether respondent's had sex by age 15, stole more than $50 by age 18, intentionally attacked or harmed someone by age 18 (Hai & Heckman 2017).

Summary Statistics for the sample are shown in Table 2.1. In terms of future outcomes, obtaining at least a Bachelor's degree, working more than 20 hours in 2010 are increasing by household net worth tercile, which are labeled as Low, Mid, and High Net Worth in the 2nd, 3rd, and 4th Columns. Having children by the age of 20 and having a history of arrests and incarcerations are decreasing by household net worth. The only outcome that does not exhibit an increasing or decreasing relationship with household net worth is serving in the military, where military service is highest for mid net worth individuals, then high net worth individuals, and finally lowest for low net worth individuals.

Next examining beliefs about future events, Table 2.1 shows that similar to outcomes beliefs about college and working 20 hours or more increase with household

[1]Which is defined as total annual hours divided by total weeks in the year

net worth, and beliefs about being arrested, becoming a victim of violence, and becoming a parent young decrease with household net worth. Likelihood of joining the military is an aberration with respect to outcomes since it declines with household net worth.

The final panel in Table 2.1 shows that youth from households with higher net worth on average have higher AFQT scores and lower levels of participation in risky behavior.

Table 2.1: Summary Statistics: Outcomes and Beliefs by Net Worth

VARIABLES	All	Low Net Worth	Mid Net Worth	High Net Worth
Bachelor's or Higher	0.0961	0.0447	0.0849	0.189
Work Avg 20 hours in 2010	0.695	0.615	0.714	0.791
Ever Served in Armed Forces	0.0630	0.0468	0.0811	0.0651
Had Children by age 20	0.180	0.274	0.169	0.0506
Been Arrested	0.349	0.400	0.354	0.263
Been Incarcerated	0.0887	0.114	0.0907	0.0482
Belief: Prob Enroll Coll	71.17	63.42	71.30	82.67
Belief: Prob Work 20+ Hrs	93.64	92.09	93.82	95.78
Belief: Prob Arrested	10.07	11.93	9.469	7.973
Belief: Prob Victim Violence	13.25	14.91	12.74	11.35
Belief: Prob Parent Young	6.882	9.088	6.667	3.778
Belief: Likelihood Join Military	2.196	2.339	2.176	2.032
ASVAB AFQT	45.84	33.21	45.55	65.53
Ever Stole $50+ by age 18	0.139	0.158	0.137	0.112
Ever Attack/harm Someone by age 18	0.301	0.371	0.311	0.181
Ever had Sex by age 15	0.370	0.471	0.380	0.204
Sample Size	4,702	1,903	1,554	1,245

2.3 Analysis

In this section first in section 2.3.1 I examine the relationship between subjective beliefs about future outcomes and actual outcomes, while controlling for household net worth, demographics, measures of cognitive ability, and participation in risky behavior. I do this by using estimating linear probability models using Ordinary Least Squares regression analysis.

Then in section 2.3.2 I examine how average differences in belief measures by household net worth tercile explain differences in average outcomes by household net worth. I do this by using a Oaxaca Blinder decomposition and reporting the pct explained by the belief covariates.

The results of this analysis can tell us to what extent beliefs explain future outcomes, and how differences in these beliefs can explain inequality in future outcomes by the measure of socioeconomic status used in this paper, household net worth.

2.3.1 Multivariate Regression Analysis: Beliefs and Outcomes

In this section we explore how beliefs about future outcomes are associated with actual realizations of outcomes. The outcomes examined are obtaining a bachelor's degree, working more than 20 hours in the year 2010, serving in the armed forces, being arrested, being incarcerated, and having children by age of 20.

$$Outcome_{i,j} = \vec{\gamma_{b,j}} \vec{Belief}_i + \vec{\gamma_{par,j}} \vec{Parent}_i + \vec{\gamma_{peer,j}} \vec{Peer}_i + \vec{\beta} \vec{X_{i,j}} + \vec{\varepsilon_{i,j}} \tag{2.1}$$

In equation 2.1 above, the subscript j represents the specific outcome examined, while subscript i represents the individual respondent to the Survey. The vectors $\vec{Belief}_i$, is a vector of beliefs shown in Table 2.1. Just as in chapter 1 $\vec{Parent}_i$ is the vector of parents outcomes including average years of schooling, mother's age at first birth, and indicators for if parents had ever been incarcerated or served in the military. The vector $\vec{Peer}_i$ is the vector of covariates for percent of peers engaged in different behavior including plans for college, cutting class, involved in sports or clubs, or in gangs. Additionally X_i is a vector of controls including household net worth, cognitive and non cognitive human capital measures, census region at the start of the survey, urban rural status at the start of the survey, sex, race and ethnicity. The parameters of interest are $\gamma_{b,j}$ which measures the relationship between beliefs and outcomes.

Table 2.2 shows the results from OLS regressions on obtaining a bachelor's degree, working more than 20 hours in 2010, and ever serving in the armed forces. Table 2.3 shows the results from OLS regressions on ever being arrested, ever being incarcerated, and being a parent before the age of 20. Beliefs about military service were only included in the military service regression in Table 2.1 due to a smaller subset of the sample answering the military likelihood question.

The first pattern shown in Table 2.2 is that there is a positive statistically significant relationship between corresponding beliefs and outcomes. For example holding household net worth, geography, and demographics constant an additional

10 percent point increase in self reported probability of going to college is associated with a nearly 1.9 percentage point increase in having a bachelor's degree. According to the model this is equivalent to a nearly $73,000 increase in household net worth holding all else constant.

Similarly holding all else equal a 10 percentage point increase in probability of working more than 20 plus hours is associated with a nearly 1.4 percentage point increase in working more than an average of 20 hours in 2010, which is equivalent to a nearly $195,000 increase in household net worth. Finally holding all else equal reporting that your are very likely to join the military relative to very unlikely is associated with an 11.6 percentage point increase in probability of joining the military.

Similarly in Table 2.3 we see that beliefs are strongly positively correlated with corresponding outcomes. For example holding cognitive ability, participation in risky behavior, and household net worth constant, belief about being arrested next year is associated with a nearly 2 percentage point and 0.8 percentage point increase in the probability of being arrested and incarcerated respectively. According to the model this is an equivalent predicted increase in arrest and incarceration probability as a decrease in AFQT by nearly 30 and 13 percentiles respectively, holding all else equal. Additionally, holding all else constant a ten percentage point increase in belief about becoming a parent in the next year is associated with 1.2 percentage point increase in the probability of having a child by age 20. This is equivalent to a decrease of AFQT by 15 percentiles holding beliefs and all else equal.

Another pattern present in Table 2.3 is that beliefs about going to college have a statistically significant negative relationship with outcomes related to risky behavior. There is also a positive statistically significant relationship with belief of becoming a parent young and probability of being arrested or incarcerated. This suggests that if students believe college enrollment is more beneficial and more likely then they will spend less time engaging in risky behavior, including crime as well as sex at young ages. This would be consistent with a model like Lochner 2004, where spending more time in school studying in high school leads to more education and labor force participation due to increased returns to schooling and less time in risky behavior like crime and sex that provide immediate payoffs but risk negatively affecting future labor market opportunities.

In summary in this section I find that beliefs and corresponding outcomes are strongly positively correlated, even when controlling for ability measures which includes measures of past or current investment of similar behavior. I also find that beliefs about education outcomes are also negatively correlated with beliefs about arrests, incarceration and early parenthood, as well as a positive relationship between beliefs about early parent hood and arrests and incarceration. The next section explores to what extent difference in household net worth mean beliefs explains inequality in outcomes of high net worth individuals versus low and mid net worth individuals.

Table 2.2: OLS Results: School and Labor Market Outcomes

VARIABLES	(1) Bachelor's	(2) Work Avg 20 hours in 2010	(3) Ever Served in Armed Forces
Belief: Prob Enroll Coll (10 ppt)	0.0189***	0.0073***	0.0006
	(0.0017)	(0.0024)	(0.0013)
Belief: Prob Work 20+ Hrs (10 ppt)	-0.0016	0.0137***	0.0003
	(0.0032)	(0.0047)	(0.0024)
Belief: Prob Arrest NY (10 ppt)	-0.0013	-0.0056	-0.0028
	(0.0033)	(0.0049)	(0.0025)
Belief: Prob Victim Violence (10 ppt)	-0.0054*	0.0043	-0.0007
	(0.0031)	(0.0041)	(0.0022)
Belief: Prob Parent NY (10 ppt)	0.0067**	0.0102**	-0.0021
	(0.0032)	(0.0048)	(0.0029)
Likelihood Military, Unlikely			0.0060
			(0.0101)
Likelihood Military, Undecided			0.0340***
			(0.0107)
Likelihood Military, Likely			0.0690***
			(0.0194)
Likelihood Military, Very Likely			0.1162***
			(0.0242)
Avg Years Parents School	0.0330***	0.0047	0.0010
	(0.0036)	(0.0041)	(0.0023)
HH Net Worth ($10,000s)	0.0026***	0.0007*	-0.0002
	(0.0004)	(0.0004)	(0.0002)
Parent Ever in Jail	-0.0030	-0.0393	-0.0093
	(0.0210)	(0.0306)	(0.0162)
Parent Serve in Military	-0.0427***	-0.0135	0.0566***
	(0.0139)	(0.0162)	(0.0111)
Mom's Age at First Birth	0.0046***	0.0015	-0.0014
	(0.0014)	(0.0017)	(0.0009)
ASVAB AFQT (10 percentiles)	0.0492***	0.0160***	0.0098***
	(0.0028)	(0.0032)	(0.0019)
Ever Stole $50+ by age 18	-0.0363**	-0.0127	-0.0134
	(0.0163)	(0.0225)	(0.0133)
Ever Attack Someone by age 18	-0.0634***	-0.0374**	0.0148
	(0.0131)	(0.0176)	(0.0108)
Ever had Sex by age 15	-0.0776***	-0.0671***	0.0103
	(0.0132)	(0.0169)	(0.0104)
Observations	4,172	4,172	3,583
R-squared	0.3505	0.0668	0.0659
Census Region & Urban Rural	Yes	Yes	Yes
Year of Birth	Yes	Yes	Yes
Gender, Race, Ethnicity	Yes	Yes	Yes
Primary School Peers	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.3: OLS Results: Early Pregnancy, Arrest and Incarceration

VARIABLES	(1) Been Arrested	(2) Been Incarcerated	(3) Parent by age 20
Belief: Prob Enroll Coll (10 ppt)	-0.0092***	-0.0033**	-0.0072***
	(0.0023)	(0.0015)	(0.0020)
Belief: Prob Work 20+ Hrs (10 ppt)	-0.0001	0.0045	-0.0046
	(0.0042)	(0.0028)	(0.0040)
Belief: Prob Arrest NY (10 ppt)	0.0205***	0.0083**	-0.0029
	(0.0046)	(0.0039)	(0.0043)
Belief: Prob Victim Violence (10 ppt)	-0.0001	-0.0014	-0.0007
	(0.0037)	(0.0028)	(0.0035)
Belief: Prob Parent Young (10 ppt)	0.0111**	0.0084**	0.0117**
	(0.0045)	(0.0038)	(0.0047)
Avg Years Parents School	-0.0062	-0.0051**	-0.0107***
	(0.0039)	(0.0025)	(0.0032)
HH Net Worth ($10,000s)	-0.0003	-0.0001	-0.0005**
	(0.0004)	(0.0003)	(0.0002)
Parent Ever in Jail	0.0654**	0.0794***	0.0668**
	(0.0283)	(0.0227)	(0.0273)
Parent Serve in Military	0.0160	0.0032	-0.0204*
	(0.0150)	(0.0095)	(0.0116)
Mom's Age at First Birth	0.0001	-0.0001	-0.0045***
	(0.0015)	(0.0010)	(0.0013)
ASVAB AFQT (10 percentiles)	-0.0068**	-0.0065***	-0.0077***
	(0.0030)	(0.0019)	(0.0023)
Ever Stole $50+ by age 18	0.2275***	0.1173***	0.0060
	(0.0221)	(0.0187)	(0.0187)
Ever Attack Someone by age 18	0.1640***	0.0451***	0.0338**
	(0.0177)	(0.0114)	(0.0141)
Ever had Sex by age 15	0.1604***	0.0437***	0.1365***
	(0.0166)	(0.0103)	(0.0142)
Observations	4,172	4,172	4,172
R-squared	0.2411	0.1280	0.1800
Census Region & Urban Rural	Yes	Yes	Yes
Year of Birth	Yes	Yes	Yes
Gender, Race, Ethnicity	Yes	Yes	Yes
Primary School Peers	Yes	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2.3.2 Oaxaca Blinder: How much do Beliefs Explain?

In the NLSY97 youth from lower net worth households are less likely to to have a college degree, work more than 20 hours, and are more likely to have been arrested, incarcerated or become a parent at young ages. With the exception of beliefs about military service, beliefs related to these events follow the same pattern where beliefs corresponding to college and work increase in optimism by net worth, and self reported probabilities of being a victim of violence, arrested, and becoming a parent at a young age are decreasing with net worth. In this section I will determine how much of the total covariate explained differences in outcomes between high net worth household individuals versus low and mid net worth individuals is due to differences in average beliefs by household net worth tercile.

The analysis will be conducted using a Oaxaca Blinder decomposition of pooled and household net worth specific OLS specifications using the same covariates in subsection 2.3.1. The output that are reported are the belief covariate contributions to the explained portion of the outcome differences divided by the total amount of the outcome differences explained by mean differences in all covariates. The results are shown in Tables 2.4 and 2.5. In order to get the percent explained of the total difference one needs to multiply the percent of the explained statistics by the total percent explained in the last row of the tables. Hypothesis tests reported are only for the individual portions and test whether the individual contributions to the explained are equal to zero under the null hypothesis. To see the full output from the Oaxaca Blinder decomposition see Appendix A.3.1.

Table 2.4 presents the Oaxaca Blinder results for outcomes related to college, military service, and work hours. Table 2.4 shows that high net worth individual's higher mean subjective probability of going to college can explain 10.8-12% of the higher explained Bachelor's attainment rates for high household net worth individuals compared to those from low or mid net worth households and 16.9% of the explained higher share of high versus mid net worth individuals. Similarly Table 2.4 shows that higher self reported probabilities of working more than 20 hours in the future for high versus low net worth individuals can explain almost 4.7% of the explained gap between high and low net worth individuals predicted by the model. When looking at the same outcome but comparing mid net worth individuals to high net worth individuals, differences in beliefs of going to college explain nearly 17 percent of the gap for high vs mid net worth individuals.

Finally for ever serving in the military, we can see that average higher average likelihood scores for joining the military of medium net worth individuals compared to high net worth individuals can explain nearly 24.1 % of the higher explained fraction of medium net worth individuals serving in the military relative to high net worth individuals. For low net worth individuals the role of military service beliefs is puzzling. The negative percent value for low net worth individuals compared to high net worth individuals, means that military service is on average lower for low net worth individuals despite low net worth individuals reporting higher self reported likelihoods of joining the military and the statistically significant positive relationship between self reported military likelihood and military service in Table 2.2.

Table 2.5 presents the results for outcomes related to participation in risky behavior, like arrests, incarceration, and becoming a parent by age 20. Table 2.5 shows lower average subjective probabilities of arrest next year of high versus low and mid net worth individuals can explain 5.5-7.8 % of the explained lower fraction of high net worth individuals being arrested than low or mid net worth individuals. Similarly high net worth individuals' lower average subjective probability of becoming a parent next year can explain between 4.6-5.5% of the explained lower arrest rates of high versus low and mid net worth individuals and 4.9% of the explained lower parent at age 20 rates of high versus mid net worth individuals.

Finally Table 2.5 shows that high net worth individuals' higher average self reported probabilities of going to college can explain between 8-16% of the smaller explained fraction of high net worth individuals ever being arrested and becoming a parent by age 20 compared to mid and low net worth individuals. These higher average self reported beliefs can also explain a marginally significant 14 percent of the smaller explained incarceration rates of high versus low net worth individuals.

In summary what Table 2.4 and Table 2.5 show that according to the estimated OLS model, differences in average beliefs can explain a significant portion of differences in almost all of the OLS predictions of later life outcomes by household net worth tercile. The portion of the covariate explained differences explained by individual beliefs ranges from 4.6 % for beliefs about arrests in mid versus high arrest rates to up to 24.2 % for beliefs about the military in mid versus high net worth military service rates. The belief variables that most often have positive statistically significant explanatory roles in explained inequality are beliefs about college enrollment, becoming a parent by age 20, and being arrested in the next year. None of this analysis has made any claims about causality, but if it is shown that these beliefs do play a causal role, then this suggests important targets for information experiments and policies that are designed to improve labor market outcomes and risky behavior participation rates for lower household net worth individuals.

Table 2.4: Pct Explained Mean Differnce: College, Military, Work Hours Outcomes

Outcome	Bachelor's	Bachelor's	Work 20+ hrs	Work 20+ hrs	Military	Military
Net Worth	Low	Mid	Low	Mid	Low	Mid
Pct of Explained Difference						
All Belief Covariates	10.38	11.94	6.61	16.89	37.5	15.73
Prob College	10.78***	11.98***	7.36	16.89***	25	1.69
Prob Work 20+ hrs	-0.12	-0.08	4.71***	1.2	4.69	0.0
Prob Arrest Next Year	0.18	-0.28	0.74	2.13	31.25*	0.56
Prob Victim Next Year	0.95**	0.28	-0.37	-1.6	-9.37	-0.56
Prob Parent Next Year	-1.42**	-0.03	-0.04**	-1.73	4.69	-10.11
Likelihood Military					-93.75***	24.16**
Total Avg Outcome Difference	0.4109***	0.2808***	0.1601***	0.0730***	0.0236***	0.0142
Total Avg Difference Explained	0.3246***	0.2462***	0.1210***	0.0752***	-0.0064	0.0178*
Total Percent Explained	78.9	87.7	75.6	103	-27.1	1.25

Note: Reference group is high household net worth tercile individuals while comparison groups are low and mid terciles. Hypothesis tests if explained portion equals zero, statistics are covariate explained portion divided by total explained
*** p<0.01, ** p<0.05, * p<0.1

Table 2.5: Pct Explained Mean Difference: Arrest, Incarcerated, Parent Outcome

Outcome	Arrest	Arrest	Incarceration	Incarceration	Parent by 20	Parent by 20
Pct of Explained Difference						
Net Worth	Low	Mid	Low	Mid	Low	Mid
All Belief Covariates	30.2	19.59	22.83	17.04	10.56	13.03
Prob College	15.78***	9.51**	13.95*	7.26	8.13***	8.97***
Prob Work 20+ hrs	-0.39	0.46	-3.59	-0.28	1.19	0.64
Prob Arrest Next Year	7.75***	5.5**	6.55	6.42*	-0.36	-1.71
Prob Victim Next Year	1.57	-0.46	0.42	-1.68	-0.47	0.21
Prob Parent Next Year	5.49**	4.58**	5.5	5.31	2.08	4.92**
Total Avg Outcome Difference	0.1211***	0.0904***	0.0587***	0.0431***	0.2028***	0.1159***
Total Avg Difference Explained	0.1020***	0.0873***	0.0473***	0.0358***	0.1686***	0.0936***
Total Percent Explained	84.2	96.6	80.6	83.1	83.1	80.1

Note: Reference group is high household net worth tercile individuals while comparison groups are low and mid terciles. Hypothesis tests if explained portion equals zero, statistics are covariate explained portion divided by total explained
*** p<0.01, ** p<0.05, * p<0.1

2.4 Conclusion and Discussion of Information Frictions

In this chapter I showed that holding household net worth, demographics, measures of cognitive ability and participation in risky behavior constant that subjective beliefs about future outcomes are strongly correlated with future outcomes, which includes a strong relationship between beliefs and their corresponding outcomes. This correlation between beliefs and corresponding outcomes includes subjective probability of college enrollment and bachelor's attainment, subjective probability of working more than 20 hours a week in the future and actually working more than a weekly average of 20 hours in 2010, subjective probability of being arrested next year and arrest/incarceration history, subjective probability of being a parent next year and actually being a parent by age 20, and finally subjective likelihood of joining the military and actual military service.

The analysis showed other interesting relationships between belies and outcomes. One example of such a relationship is a statistically significant positive relationship between beliefs about going to college and actually working more than 20 hours a week in 2010 as well as a positive statistically significant relationship between beliefs about being a parent in the next year and being arrested or incarcerated. Additionally there was a statistically significant negative relationship between self reported probability of going to college and being arrested, being incarcerated, and becoming a parent by age 20. These relationships are consistent with Lochner 2004, where increased schooling leads to more labor force participation due to higher earnings, and decreased schooling leads to more participation in crime that leads to a higher probability of arrests. Even though Lochner 2004 did not include sex at young ages the trade offs of immediate payoffs and future potential penalties to labor force participation can apply to this activity too.

Additonally, I also showed using a Oaxaca Blinder decomposition that OLS predicted socioeconomic inequality in higher education, arrests and early parenthood rates could be explained by differences in mean belief values by household net worth tercile. Specifically, high net worth individuals higher mean self reported probability of going to college can explain between 8.1 to 16.9 percent of the explained higher fraction of high net worth individuals obtaining a bachelor's degree and a lower fraction of high net worth individuals being arrested or being parents by age 20 in comparison to mid or low net worth individuals[2]. Additionally a higher net worth individuals' lower mean self reported probability of being arrested next year and being a parent next year explain between 4.6 to 7.8 percent of the model explained difference in arrest rates compared to low and mid net worth individuals. Finally mid net worth individuals' higher mean self reported likelihood of military service and being a parent next year explained 24.2 and 4.9 percent of the OLS explained higher fraction of mid net worth individuals joining the military and being a parent by age 20.

This together with the results from Chapter 1 suggests that there may be evidence to believe that youth from lower socioeconomic backgrounds with similar levels

[2]with the exception being mid versus high net worth individuals working more than hours a week

of cognitive ability and participation in risky behavior as more affluent peers may be less likely to obtain a bachelor's degree and more likely to be arrested, incarcerated, or become a parent at a young age because of social learning from peers and parents attributes. Where these peers and parents have different characteristics than peers and parents from more affluent backgrounds.

In order to test whether this is the case it is necessary to see whether individuals base their estimates of their own ability or comparative advantage in participating in different activities like school, work, or risky behavior on peer and parent attributes. It is also important to test whether these estimates are inaccurate or place excessive weight on peers and parents attributes versus measures of ability that may provide more reliable information. In other words are there information frictions that lead to inefficiencies in higher education, labor, and black market activities due to social learning or role modeling.

In the next chapter I propose one way to answer this question using one example of these beliefs and a corresponding outcome studied in Chapters 1 and 2, namely beliefs about going to college and college outcomes. To do this I will use a structural model that makes explicit assumptions of how beliefs about academic ability are reported to self reported beliefs about going to college, and how these beliefs about ability affect enrollment and drop out in higher education while taking into account heterogeneous access to resources, human capital, and credit constraints. I also need to make assumptions about the latent academic ability distribution and how this relates to observed outcomes like grades, earnings, ASVAB AFQT scores and participation in risky behavior. Since the beliefs affect decisions and since latent ability affects outcome, I am able to use the panel aspect of the NLSY97 to get an estimate of information frictions which is the difference between individual subjective beliefs about academic ability and objective probabilities of academic ability using future outcome realizations. Once this is calculated I can then make predictions using the structural model how policy changes that provide more information or funding affect inequality in higher education by demographic background.

Chapter 3

Seperating Beliefs from Reality in Higher Education

Is College Worth It For Me? Beliefs, Access to Funding, and Inequality in Higher Education

3.1 Introduction

In the United States there are still large gaps in bachelor's attainment by race, ethnicity, and socioeconomic status (SES). Even among students with high academic ability, youth from lower socioeconomic backgrounds are less likely to enroll in four-year institutions and selective colleges (Hoxby and Avery 2013). Empirical evidence suggest that an explanation for this is that information frictions lead to underinvestment in education for high ability youth in families which adults have less college experience (Hoxby and Turner 2013). Specifically, because the whole college experience might be less familiar to these youth, they may have less information about their own college ability and expected returns than their more affluent peers with similar measures of academic ability.

This paper focuses on differences in bachelor's attainment rates by demographic group. First, I focus on youth with high measures of academic ability and good behavior, which will be referred to as "High-Scorers," and I ask, how do differences in beliefs about own college ability affect inequality in bachelor's attainment rates for high-scorers. The measure of inequality that I use is the difference in bachelor's attainment rates between a given demographic group of interest and high-SES White youth. I focus on three demographic groups low-SES youth regardless of race, and Black and Hispanic youth, regardless of SES. In the process I also document how much of inequality is due to differences in financial assistance either from colleges, government, or family. This question is important to answer because if information frictions lead to underinvestment for high scorers from disadvantaged backgrounds than this could imply serious economic costs, such as foregone earnings or growth (Hsieh, Hurst, Jones, and Klenow 2020).

I find that differences in beliefs explain 38 percent of the low-SES high-scorer gap, and 49 percent of the Hispanic high-scorer gap. In contrast, differences in beliefs explains 15 percent of the Black high-scorer gap. However, I am unable reject a null hypothesis of a zero effect of beliefs on the Black high-scorer gap. Additionally, I find that for all three comparison groups differences in financial assistance play big statistically significant roles in explaining gaps, where explained contributions range between 45-50 percent depending on demographic group.

I then turn to studying policy interventions designed to narrow overall inequality regardless of ability. In particular, are policies that target low-SES high-scorers with information and funding more efficient at decreasing overall inequality than policies that are universally applied to all, like free college for all or better information to all? I use the same measure of inequality as in the decomposition exercise, but this time not restricting the analysis to high scorers. The efficiency measure that I use to evaluate the policies is college mismatch, which is the percentage of youth who would make different bachelor's attainment decisions should they have complete knowledge about ability. This takes the form of over-investment of low-scoring youth, and under-investment of high-scoring youth in education. The more targeted policy can be likened to college recruiting efforts like those studied in Dynarski, Michelmore, Libassi, and Owen 2019 or information campaigns as in Hoxby and Turner 2013.

I find that the targeted policy (providing information and funding only to low-SES high scorers), is the most efficient policy at reducing inequality, because it most effectively narrows bachelor's attainment gaps. The reductions range between 25-42% depending on demographic group[1]. The targeted policy also decreases mismatch by encouraging more education investment from high-scorers and thus overcoming underinvestment in higher education. Free college for all decreases inequality at the cost of increased mismatch, because bachelor's attainment rates increase primarily among low-scorers who would not complete college if they knew their scorer type with certainty. This happens because low scorers are too optimistic relative to the their actual ability. Although the tracking system reduces mismatch, it increases inequality, because increases in bachelor's attainment among high-scorers are offset by decreases in bachelor's attainment from low-scorers who comprise a larger fraction of the population for the groups of interest.

My analysis is based on a dynamic discrete choice model with credit constraints, heterogeneous financial support, and heterogeneous beliefs about ability. The model includes two latent ability types, low and high-scorers, as well as learning about type through GPA. To estimate the model, I use the National Longitudinal Study of Youth 1997, which contains information on earnings, education outcomes, self-reported beliefs, financial assistance, and demographic information for youth born in the early 1980s. The data set is particularly useful for this exercise because it over samples Black and Hispanic youth.

The crucial objects of interest are the proportion of high-scorers by demographic group, and the distribution of beliefs about one's ability type. I estimate the proportion of high scorers outside of the model by using a finite mixture model with

[1]It reduces the Black gap by 25%, Hispanic gap by 28%, and the low-SES gap by 42%

two latent types governing earnings, grades, and human capital measures. I estimate the distribution of beliefs together with the remaining model parameters via indirect inference. The identification of beliefs comes from two important targets: the coefficient from self reported beliefs about college outcomes regressed on enrollment, and the coefficients from grade categories regressed on college exit, both holding financial assistance and demographics constant[2].

Estimating beliefs in this way allows beliefs to not be restricted to be rational priors that match the ability distributions estimated from the data. It also allows the distribution of beliefs to differ by demographic groups. The model and the estimated prior beliefs allow me to examine how within ability groups, beliefs differ with respect to actual latent type and hence generate mismatch. They allow me to examine how they differ with respect to rational priors and hence how providing information affects choices. They also allow me to examine how they differ by demographic group and hence affect inequality.

Overall my results suggest that targeting information and funding to low-SES high scorers can efficiently increase representation in higher education among Black, Hispanic, and low-SES youth. However,substantial inequality remains even after this intervention. This is because differences in early childhood human capital investment are important in explaining differences in bachelor's attainment rates by demographic group. This suggests that further understanding what generates higher education gaps requires not only uncovering what leads to differences in beliefs (DeLuca, Papageorge, Boselovic, Gershenson, Gray, Nerenberg, Sausedo, & Young 2021), or what affects differences in early childhood human capital stock (Cunha & Heckman 2007; Moschini 2021) but also how beliefs interact with human capital investment at the individual and parent's level (List, Pernaudet, & Suskin 2021).

3.1.1 Contribution to the Literature

This paper contributes to the structural modeling literature that focuses on the role of information frictions in higher education decisions. One strand of previous work uses nationally representative panel data to study the role of information frictions in the decision to go to college (Navarro and Zhou 2017; Cunha, Heckman, and Navarro 2005[3]). The second strand of the literature uses panel data from a single university that include subjective beliefs and grades to study the roll of belief formation on dropout and major choice (Arcidiacono, Hotz, and Kang 2012; Stinebrickner and Stinebrickner 2014; Wiswall and Zafar 2015; Reuben, Wiswall, and Zafar 2015).

My paper is closest to Arcidiacono, Aucejo, Maurel, and Ransom 2016. As in this paper, I bridge the two strands of the literature by examining the role of information frictions on education outcomes while controlling for selection into college through enrollment. This paper's main innovation is to relax the rational expectations

[2]For an example in the context of occupation choice for how belief paramaters are identified by exit/switching behavior see Papageorgiou and Lopes De-Melo 2016.

[3]These papers estimate information sets by conducting factor analysis on the error terms of wage regressions along with regressing education choices on factors to test if factors were known at the time of the decision.

assumption, that assumes agent's initial prior beliefs about own ability (in this case scorer type) are identical to the ability distribution observed in the data. I am able to separately estimate the initial prior distribution of beliefs by using data on self-reported beliefs about higher education outcomes and predicted model behavior. Specifically I do this by targeting the relationship between measured beliefs and college outcomes, as well as differences in non continuation by grade in the data that corresponds with the learning mechanism in the model.

Because of this there is room for beliefs to be too optimistic or too pessimistic relative to rational expectations. Additionally the distribution of beliefs can differ by demographic group, which allows differences in beliefs to play a role in generating inequality in higher education outcomes. Under rational expectations this heterogeneity would likely be captured by differences in the residual of the model. Therefore relaxing this assumption not only allows me to better estimate the role that beliefs play in generating outcomes, but also more accurately estimate efficiency commonly measured by ex post regret (referred to earlier as education mismatch) in the literature, as well as the effects of policy on outcomes and efficiency.

This paper also contributes to the empirical literature documenting that information campaigns can increase enrollment and completion for high achieving students from lower income backgrounds. (Dynarski, Libassi, Michelmore, Owen 2020; Hoxby and Turner 2013; Bettinger Long, Oreopoulos, and Sanbonmatsu 2012). The results of my policy analysis not only validate the findings of these papers but also show that if the policies studied in these papers were enacted at the national level, then they could increase representation in higher education and decrease mismatch across the United States. These policies can be more effective and generate less inefficiencies than free college for all. They are also likely to be less resource intensive than subsidizing college for everyone.

3.2 Empirical Analysis and Facts

Before discussing the model, this section will show that in the data subjective beliefs are highly correlated with parental education and high school peers college plans as well as with outcomes like college enrollment, continuation, and completion while holding human capital and financial resources constant. Segments of this empirical analysis will inform the structural model. Specifically, the relationship between education outcomes and belief measures, financial assistance, and grades, will be used as moments to identify model parameters.

3.2.1 Data

The dataset used in this analysis is the 1997 wave of the National Longitudinal Study of Youth (NLSY97). The NLSY97 is a nationally representative longitudinal data set of individuals born between 1980-1984 living in the United States. The survey was administered annually from 1997 to 2011 and then biannually from there forward. The survey also over samples Black and Hispanic youth in the US. This makes the

NLSY97 useful for studying racial and ethnic inequality.

In the analysis that follows I control for cognitive human capital through the Armed Services Vocational Aptitude Battery (ASVAB) Armed Forces Qualifications Test (AFQT), which scores a youth's performance on mathematics and verbal test scores. The units of measurement for AFQT are percentiles. I also control for non-cognitive human capital using indicators for adverse behavior at young ages including sex before age 15, ever committed an act of violence before the start of the survey, and ever stole a value greater than $50 before the start of the survey.

3.2.2 Empirical Facts

In this section I review some empirical facts in the NLSY97. Summary statistics by parental education and by race are reported in Appendix B.1 under Table B.2 and Table B.3. The summary statistics in the appendix show that Black, Hispanic, and lower education background youth have low enrollment and bachelor's attainment rates. They also have less access to resources measured by household net worth, and family financial aid in college. They have lower measures of human capital, as well as more pessimistic beliefs.

In the NLSY97, a good portion of the disparities in schooling outcomes and beliefs for Black and Hispanic youth can be explained by observables. Despite less enrollment, continuation, and optimism on average, in the analysis that follows, being Black or Hispanic is strongly positively correlated with enrollment and optimism towards enrollment. College completion and beliefs about having a degree by age 30 are also strongly positively correlated with being Black, holding all else constant[4]. For Black and Hispanic youth, a large portion of the unconditional gap in schooling and beliefs can be explained by parental education, house hold net worth and human capital measures, with some unexplained portion remaining significant for Hispanics regarding parental education effects on beliefs (see Oaxaca Blinder decompositions in Table B.5-B7 in Appendix section B.2 and summary statistics Tables B.2-B.3 in Appendix A.1.).

Table 3.1 studies whether self-reported beliefs are positively correlated with schooling outcomes. The measure of beliefs is the College Outcomes Belief variable which is self reported probability of having a degree by age 30 for those born before 1982 and self reported probability of enrolling in college for those born after 1982. It shows that parental education and self reported beliefs about college outcomes are highly correlated with college enrollment, college continuation, and hence bachelor's degree attainment. Additionally, there is a strong role for parental education as well. Table 3.1 shows that holding all else constant if my parent's average years of schooling

[4]The positive coefficient on beliefs and on outcomes could be consistent with pessimistic initial beliefs, where beliefs that are measured are a weighted average from the prior and some signal. Then holding signal and prior constant, a positive coefficient for race/ethnicity means that the noise in the signal is positive, meaning grades where higher than expected. To test this on beliefs, early and later measures are needed. But if enrollment increases with higher measured beliefs than the positive coefficient for race/ethnicity is consistent with more pessimism that was adjusted upward more rapidly because of downward bias.

Table 3.1: College Outcomes

VARIABLES	(1) Ever Enrolled	(2) Bachelors Attained	(3) Complete College
Parent Education	0.0292***	0.0375***	0.0427***
	(0.0048)	(0.0056)	(0.0070)
Household Net Worth ($1000s)	0.0001***	0.0002***	0.0001*
	(0.0000)	(0.0001)	(0.0001)
ASVAB AFQT	0.0055***	0.0057***	0.0035***
	(0.0004)	(0.0004)	(0.0006)
College Outcome Belief	0.3226***	0.2151***	0.2164***
	(0.0346)	(0.0283)	(0.0491)
Female	0.0806***	0.0847***	0.0411*
	(0.01755)	(0.0186)	(0.0237)
Hispanic	0.0812***	0.0535*	0.0525
	(0.0302)	(0.0286)	(0.0381)
Black	0.1700***	0.1487***	0.1732***
	(0.0266)	(0.0256)	(0.0350)
College GPA			0.1803***
			(0.0152)
Total Govt/Inst Aid ($1000s)			0.0058**
			(0.0027)
Total Fam Aid ($1000s)			0.0075**
			(0.0035)
Total Stud Loan ($1000s)			-0.0081**
			(0.0036)
Geography Controls	Yes	Yes	Yes
Birth Year	Yes	Yes	Yes
Non Cognitive Controls	Yes	Yes	Yes
Peer Effects	Yes	Yes	Yes
Observations	2,133	2,133	1,467
R-squared	0.3499	0.3612	0.3240

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.1: OLS Results: Higher Education Outcomes on College Belief

increases by one year, the probability I attain a bachelor's degree increases by 3.75 percentage points. Additionally if my self reported belief of having a degree by age 30 increases by 0.2, that probability of bachelor's attainment increases by nearly 4 percentage points. This increase in one year of parents education or 0.2 of my self reported beliefs, holding all else constant, is equivalent to a nearly $200,000 increase in household net worth, holding beliefs and parental education constant. The strong relationship between beliefs, parental education, and schooling outcomes continues to hold in Column 3 even with the inclusion of college GPA, and financial resources available in college. This is in addition to controlling for human capital measures, birth year, and geography variables.

Given the strong correlation between beliefs and schooling outcomes, Table 3.2 examines which covariates are strongly associated with beliefs. [5]. Table 3.2 shows that elements of a youths background like parental education and high school peer beliefs holding all else constant are associated with more optimism. An additional year in parents education is associated with a nearly 3 percentage point increase in the self reported probability of enrollment or degree by age 30. Number of peers with college plans is also positively associated with more optimism. If youth went to a high school where more than 90% of high school peers are planning on going to college as opposed to one where less than 10% were, than self reported probability of degree attainment and enrollment would increase by close to 20 percentage points. This is consistent with the findings of Hoxby and Avery 2013 and Hoxby and Turner 2013. Their findings suggests that low-SES youth may know less about suitability for college resulting from less adults in their social networks that have higher education experience and less peers that go to college.

Although Table 3.1 establishes a relationship between beliefs and continuation, next in Figure 3.1 and Table 3.3, I evaluate the difference of college non-continuation behavior by observables, within grade categories. College non-continuation is measured by students who enroll and do not complete a 4 year degree. This includes those that enroll in community college and exit upon receiving an associates degree[6].

[5]Sample size differences in Table 3.2, is due to the fact that the probability of degree question was only asked to the older cohort, and probability of enrollment was asked for the younger cohorts while in high school. For Table 3.1 and the quantitative analysis a measure of beliefs combining both variables was used, see Appendix B.1.

[6]Those enrolled in 2 year degree programs are included because they have the option to transfer credits to a four year university. Also according to Hoxby and Avery 2012 it is not obvious that this is always the cheapest option for college.

Table 3.2: Measured Beliefs

VARIABLES	(1) Probability Degree	(2) Probability Enroll
Parent Education	0.0267***	0.0282***
	(0.0046)	(0.0058)
Household Net Worth ($1000s)	0.0001***	0.0001**
	(0.0000)	(0.0000)
ASVAB AFQT	0.0022***	0.0022***
	(0.0004)	(0.0004)
Peers Coll Plan About 25%	0.0812	0.1289*
	(0.0709)	(0.0766)
Peers Coll Plan About 50%	0.1110*	0.1314*
	(0.0671)	(0.0692)
Peers Coll Plan About 75%	0.1662**	0.1562**
	(0.0670)	(0.0695)
Peers Coll Plan more than 90%	0.2117***	0.1954***
	(0.0675)	(0.0691)
Female	0.0767***	0.0117
	(0.0168)	(0.0205)
Hispanic	0.0435	0.1174***
	(0.0268)	(0.0323)
Black	0.0978***	0.1071***
	(0.0246)	(0.0312)
Geography Controls	Yes	Yes
Birth Year	Yes	Yes
Non Cognitive Controls	Yes	Yes
Observations	1,143	1,139
R-squared	0.2614	0.2304

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.2: OLS Results: Belief Regressed on Parent Education, Demographics, and Peers

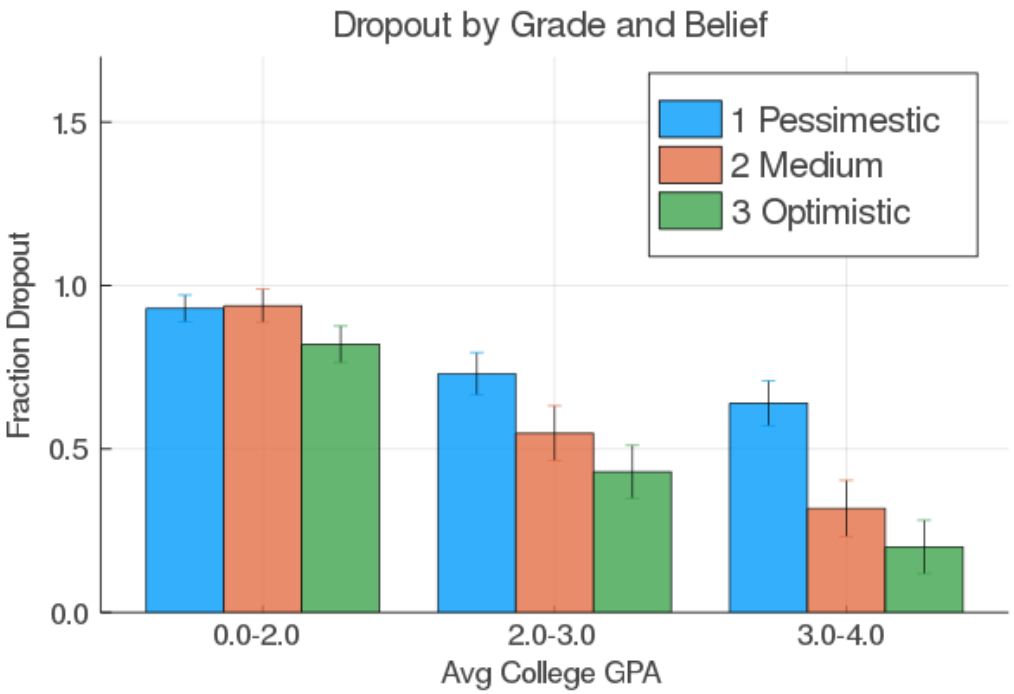

Figure 3.1: College non-continuation rates conditioned on grades/demographics.

Table 3.3: Non Continuation Interacted with GPA

VARIABLES	Non Interacted	Interaction GPA 2.0-3.0	Interaction GPA > 3.0
College Belief	0.0775	-0.2604**	-0.2249**
	(0.0543)	(0.1021)	(0.1092)
Hispanic	-0.0673		
	(0.0492)		
Black	-0.0539		
	(0.0413)		
Parent Education	-0.0179**		
	(0.0089)		
Household Net Worth ($1000s)	-0.00003		
	(0.00007)		
Total Govt/Inst Aid ($1000s)	-0.0179***		
	(0.0042)		
Total Fam Aid ($1000s)	-0.0118		
	(0.0072)		
Total Stud Loan ($1000s)	-0.0057		
	(0.0049)		
ASVAB AFQT	-0.001		
	(0.0007)		
GPA 2.0-3.0	-0.1513*		
	(0.0859)		
GPA > 3.0	-0.3431***		
	(0.0929)		
Geography Controls	Yes		
Birth Year	Yes		
Non Cognitive Controls	Yes		
Gender	Yes		
Observations	1,028		
R-squared	0.2576		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.3: OLS Results: College Non Continuation on Beliefs and Grades Interacted

Although non-continuation decreases with higher grades, Figure 1 shows that this exit behavior within grade categories differs by beliefs concerning bachelor's attainment. In Table 3.3 we control for measures of human capital and financial resources and still find statistically significant coefficients for the belief variable interacted with GPA category.

The decrease in non-continuation with higher grades, as well as the different effects of grades by belief levels is consistent with the hypothesis that agents don't know their individual returns to college and learn through grades. According to Figure 3.1 and Table 3.3 low grades are a strong signal for low returns, and high

grades are a strong signal for high returns[7]. As suggested by the belief medium grade coefficient, more optimism might matter more for the medium grades, since the signal from medium grades is more ambiguous than low or high grades.

These results are consistent with predictions from Bayesian learnings models. In this case where beliefs about college outcomes reflect beliefs about ability and hence utility. Grades would therefore provide a signal of ability, where a better signal leads to more optimism and more continuation. As Table 3.3 shows, for any belief level, getting higher grades and hence a better signal leads to a higher probability of continuation. Since according to Bayes rule, beliefs are proportional to the prior times the probability distribution of grades, an ambiguous signal would make the posterior and hence continuation more dependent on the prior. Here we see that the marginal effect of beliefs is higher at medium grades which would be a more ambiguous signal then high or low grades. Additionally if agents are near certain of their type, then they would readjust their estimates less with bad signals, and hence exhibit more persistence. In fact as agents become more optimistic about college outcomes the difference in probability of continuation between high and medium grades decreases by 4 percentage points.

Altogether this analysis suggests a connection between subjective beliefs, parental education and college outcomes like enrollment, continuation, and degree attainment. Differences in human capital, subjective beliefs, and access to financial assistance by demographic group likely play a role in generating inequality in higher education outcomes as well, which will be explored in the quantitative analysis of the paper.[8]

3.3 Economic Model

In this section that follows I will propose a theoretical model that will be calibrated to match moments from the NLSY97 to show how differences in beliefs, along with differences in human capital, financial assistance, and non-pecuniary utility generate higher education decisions and inequality in education outcomes. Once the model is calibrated I will also discuss to what extent there is mismatch in the higher education market and whether any of the three policies that will be discussed can decrease inequality without generating more mismatch.

The economic environment consists of agents who live $T = 24$ periods, where each period lasts 2 years and represents an age span from 18-66. In each period agents can save or borrow up to a specified borrowing limit. Once an agent begins work, they do not return to school, so the education problem acts as a three stage problem. In the first stage agents decide to enroll or work until the end of the life cycle. If agent's enrolled in the first stage, then in the second stage agents choose to continue with school or work until the end of the life-cycle. Finally if agents chose to continue school, then in the third stage agents work for the remainder of the life cycle and

[7] Given by positive stand alone belief coefficient and the marginally significant stand alone coefficient for high grades

[8] As shown in Figure B.1 appendix B.2 there is little evidence of differences in lower returns to college for Black, Hispanic, low familial wealth, and low parental education youth in the sample.

realize type dependent earnings and non pecuniary utility.

In the model agent i has an unknown type $\tau_i \in \{\tau_h, \tau_l\}$ for being a high-scorer or low-scorer, respectively.The latent ability type τ_i determines the distribution of grades while in college $\pi(g_k, \tau_i)$ for $k \in \{l, m, h\}$, for low, medium and high grades respectively. The latent ability type τ_i also determines earnings $w_c(\tau_i)$, and non-pecuniary utility, $\mu_c(\tau_i)$ in the final stage of the model. The two variables for τ_i are hence a parsimonious one dimensional representation of the important role that cognitive and non cognitive skills play in generating education outcomes. Because of this τ_h represents the latent ability value of high-scorers since if an agent has τ_h they have a higher probability of achieving higher grades, higher earnings, and non pecuniary utility from college.

The realization of τ_i depends on true probability $P_{\text{true},i}$ of being type τ_h. This true probability depends on parental education, household net worth, race, ethnicity, sex, and measures of human capital. As such, it also captures the effect of early childhood human capital investment on educational attainment and earnings.

In the model agents will not know $P_{\text{true},i}$ but they will have a subjective belief P_i. They then update P_i after receiving grades in college as in Stinebrickner & Stinebrickner 2012. This subjective belief captures a broad belief about success at college for the individual, since an individual with $\tau_i = \tau_l$ is more likely to have lower grades, lower earnings, and less utility from graduating college.

3.3.1 Timeline of the problem

A decision tree representation of the problem is shown in Figure 3.2. In the decision tree subscripts are suppressed for ease of illustration. In the first stage agents have subjective belief P_i, asset level $b_{1,i}$, non-pecuniary utility shocks for work and school, $\vec{\varepsilon}_{1,i} = (\varepsilon_{c,1,i}, \varepsilon_{w,1,i})$. Agents choose between working and earning non college earnings w_n for the rest of the life cycle, or enrolling in college where they pay net tuition, $f_{1,i} = tuit_1 - Aid_{GC,i} - Aid_{Fam,i}$, which is the sticker price net of financial aid from government/colleges and families for the first period of life.

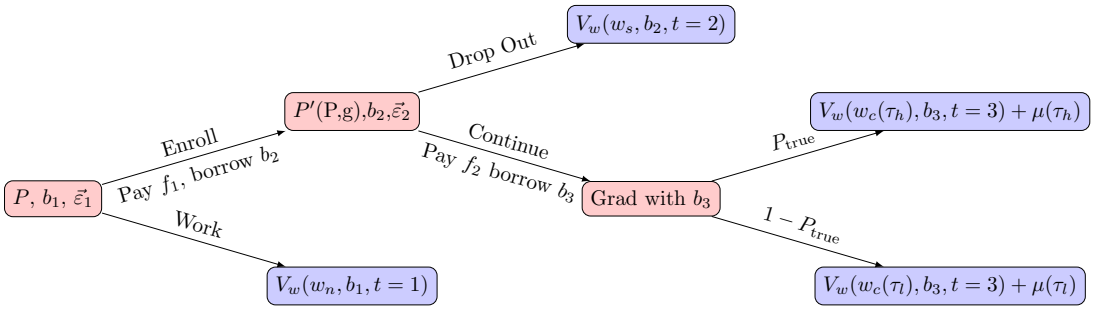

Figure 3.2: Decision tree representation of the quantitative model

In the second stage agents realize a signal for their latent type given by the GPA g_i during the previous schooling period. They then update P_i to $P'(P_i, g_i)$ and observe non-pecuniary utility shocks for school and work, $\vec{\varepsilon}_{2,i} = (\varepsilon_{c,2,i}, \varepsilon_{w,2,i})$. They then decide to continue schooling and pay period 2 net tuition $f_{2,i} = tuit_2 - Aid_{GC,i} - Aid_{Fam,i}$ for another period, or exit to work for the rest of their lives and earn w_s each period.

If agents complete school then after they work and earn earnings that depends on their type, $w_c(\tau_i)$ each year and receive non monetary utility $\mu(\tau_i)$ from work. Agents make borrowing and saving decisions in all periods of the problem, whether in school or in the labor force. During School, the borrowing limit is $-B_s(t)$, while in the labor force it is $-B_n(w)$, with $-B_s(t) \geq -B_n(w)$. Hence credit constraints are tighter while enrolled in school (Lochner and Monge-Naranjo 2012).

Heterogeneity by parental background, race, and ethnicity enters the problem through four channels. The first one is the distribution of initial subjective beliefs P_i of one's own ability type.The second is through transfers from parents, as well as from the government, and colleges that often provide need based financial assistance. This second channel leads to differences in net tuition $f_{t,i}$ for $t = 1, 2$ while in school. The third channel is the true probability of being type τ_h, $P_{\text{true},i}$ which determines the distribution of grade realizations and future earnings. Finally, the fourth channel is the distribution of non-pecuniary utility shocks $\vec{\varepsilon}_{t,i}$.

The model has no explicit role for discrimination. However discrimination could enter the problem through past policies that created differences in parental education and net worth. It can enter through the amount of aid the government or colleges distribute. It can enter through wages and grades, and hence $P_{true,i}$. It can also enter through early childhood human capital that determines the realization of human capital measures.

To allow for human capital development while in school, mean earnings are such that $w_n < w_s \leq w_c(\tau_i)$ reflecting increasing returns to years of schooling regardless of one's type. Even though expected earnings increase with schooling, a binding credit constraint while in school will make college much less appealing for those with $\tau_i = \tau_l$. This is because agents are unable to consumption smooth and face lower consumption for the first two periods of their life. If youth receive less financial assistance during college, or are more pessimistic about being a high scorer, than this

will make college less appealing for students from demographic groups where this is more likely the case.

3.3.2 Enrollment Stage

At age 18, agents either enroll in school or work. If they choose to work at this stage they will do so until the end of the life cycle. Agents begin with a belief P_i that they are of type τ_h, a net tuition realization $f_{1,i}$, initial assets $b_{1,i}$, and unobserved tastes for college and work $\vec{\varepsilon}_{1,i} = (\varepsilon_{c,1,i}, \varepsilon_{w,1,i})$. The agent's stage 1 problem is thus given by (3) below, where $V_w(w_n, b_{1,i}, 1) + \varepsilon_{w,1,i}$ is the utility from working and $V_{c,1}(P_i, f_{1,i}, b_{1,i}) + \varepsilon_{c,1,i}$ is the utility from enrolling in college.

$$(3) \quad V_1(P_i, f_{1,i}, b_{1,i}, \vec{\varepsilon}_{1,i}) = \max\{V_w(w_n, b_{1,i}, 1) + \varepsilon_{w,1,i}, V_{c,1}(P_i, f_{1,i}, b_{1,i}) + \varepsilon_{c,1,i}\}$$

$$s.t.$$

$$V_{c,1}(P_i, f_{1,i}, b_{1,i}) = \max_{b_{2,i} \geq -\tilde{B}_{s,1}} [u(Rb_{1,i} - f_{1,i} - b_{2,i}) + \beta \mathbb{E}_{g,\varepsilon}(V_2(P'(g, P_i), f_{2,i}, b_{2,i}, \vec{\varepsilon}_{2,i})) \ | P_i \ ]$$

Agents update beliefs after realizing grades using Bayes Rule according to equation (4), where the new belief $P'(g, P_i)$ is given below. Where $\pi(g_k, \tau_j) = Prob(g_k | \tau = \tau_j)$.

$$(4) \quad P'(g_k, P_i) = \frac{P_i \times \pi(g_k, \tau_h)}{P_i \times \pi(g_k, \tau_h) + (1 - P_i) \times \pi(g_k, \tau_l)}$$

3.3.3 Continuation Stage

At age 20, agents make the decision to continue and complete college or exit and work for the remainder of the life cycle. Agents observe GPA g from the first stage and then update belief P_i to $P'(g, P_i) = P_i'$. They realize period 2 net tuition $f_{2,i}$ and begin the second stage with debt/savings from the first stage $b_{2,i}$. They also realize unobserved tastes for college and work $\vec{\varepsilon}_{2,i} = (\varepsilon_{c,2,i}, \varepsilon_{w,2})$ respectively. The agent's problem is given by

$$(5) \quad V_2(P_i', f_{2,i}, b_{2,i}, \vec{\varepsilon}_{2,i}) = \max\{V_w(w_s, b_{2,i}, 2) + \varepsilon_{w,2,i}, V_{c,2}(P_i', f_{2,i}, b_{2,i}) + \epsilon_{c,2,i}\}$$

$$s.t.$$

$$V_{c,2}(P_i', f_{2,i}, b_{2,i}) = \max_{b_{3,i} \geq -\tilde{B}_{s,2}} [u(Rb_{2,i} - f_{2,i} - b_{3,i}) + \beta(P_i'[V_w(w_c(\tau_h), b_{3,i}) + \mu_c(\tau_h)]$$
$$+(1 - P_i')[V_w(w_c(\tau_l), b_{3,i}) + \mu_c(\tau_l)]) \ ]$$

During college grades reveal information about τ_i because the grade distribution depends on τ_i. But because τ_i also determines one's non-pecuniary utility, the

information revealed in school can also include psychosocial elements of higher education that are often discussed in other contexts[9]. In this model, the assumption is that this is closely tied to grade performance, and a bad signal in grade performance will likely reinforce that college will not be a good fit for the individual. Factors that are likely to be more stable between the first and second period such as distance from home community, enjoyment of school, and family obligations are captured by a age-constant location parameter of non-pecuniary shocks $\vec{\varepsilon}_{t,i}$.

3.3.4 Workers Problem

Finally, the workers problem is given by (1) below. The state variables are earnings w, assets/debt b_i, and age t.

$$(1) \quad V_w(w, b_i, t) = \max_{\{b_{n,i} \geq -\tilde{B}_n(w)\}_{n=t}^{T}} \sum_{n=t}^{T} \beta^{n-t} u(w + Rb_{n,i} - b_{n+1,i})$$

Per period utility $u(\cdot)$ is given by CRRA preferences

$$(2) \quad u(c_i) = \frac{c_i^{1-\gamma} - 1}{1-\gamma}$$

For every period the borrowing constraint is given below. Therefore in the final period $b_{T+1} = 0$.

$$\tilde{B}_{T-n}(w) = \sum_{m=1}^{n} w(1+r)^{-m} \quad \text{for} n \geq 1$$

$$\tilde{B}_T = 0$$

3.3.5 Optimal Choice

Since in the first two stages the agent faces a discrete choice problem, the optimal decision for each agent is described by a cutoff rule with respect to one's belief about one's type. If P_i is higher than a certain threshold the agent will enroll. For example in the first stage the optimal decision is characterized by equation 6 below, where $\sigma_{d,2}, \mu_{d,2,i}$ are the normalized scale parameter and location parameters[10] for the Type I extreme value shocks.

$$(6) \quad \text{Choice}_{t=1,i} = \begin{cases} \text{Enroll} & \text{if} \quad P_i > \tilde{P}_1(b_{1,i}, f_{1,i}, f_{2,i}, \vec{\varepsilon}_{1,i}, \mu_{d,2,i}, \sigma_{d,2}) \\ \text{Work} & \text{if} \quad P_i \leq \tilde{P}_1(b_{1,i}, f_{1,i}, f_{2,i}, \vec{\varepsilon}_{1,i}, \mu_{d,2,i}, \sigma_{d,2}) \end{cases}$$

[9]Examples include differences in the prevalence of impostor syndrome or stereotype threat by race, gender, ethnicity discussed in the sociology literature.

[10]Normalized with respect to the difference in Type I extreme values. This because the difference in shocks is what is identified

.

Similarly, in stage 2, given $\{\pi(g_k, \tau_j)\}_{k,j}$ the decision to continue also follows a cutoff rule for updated belief $P'(g_k, P_i)$ after realizing $g_k, \varepsilon_{c,2,i}, \varepsilon_{w,2,i}$ and starting with P_i, given by equation (7) below.

$$(7) \qquad \text{Choice}_{t=2,i} = \begin{cases} \text{Continue} & \text{if} \quad P'(g_k, P_i) \geq \tilde{P}_2(b_{2,i}, f_{2,i}, \vec{\varepsilon}_{2,i}) \\ \text{Dropout} & \text{if} \quad P'(g_k, P_i) < \tilde{P}_2(b_{2,i}, f_{2,i}, \vec{\varepsilon}_{2,i}) \end{cases}$$

.

The cutoff rules holding non-pecuniary utility shocks and distribution constant, allow us to predict the effects of financial assistance, subjective beliefs, and human capital embedded in $P_{true,i}$.For instance, if the distribution of non-pecuniary utility is such that utility from the decision to work is less than the utility from college for being τ_h, and greater than the utility from college for being τ_l, then the decision rules are strictly increasing in $f_{1,i}, f_{2,i}$, depending on the period. $P'(g_i, P_i)$ also increases in P_i and for $P_i \in (0, 1)$, if higher grades provide a strong signal of being τ_h, $P'(g_i, P_i)$ will increase in g_i. Therefore probability of enrollment and probability of continuation would increase with financial assistance, one's belief about being τ_h, and with higher $P_{true,i}$.

3.3.6 Example for Model Prediction

We now turn to illustrating how financial assistance, subjective beliefs of being τ_h, and grades (whose realizations reflect earlier human capital investments) affect one's probability of enrollment, continuation, and degree attainment in the model.

In Figure 3.3 we see that more financial assistance through lower net tuition leads to a higher probability of enrollment at all belief levels. Because of the belief cutoff, the probability of enrollment displays a flat portion and then increases with subjective beliefs. This is the case for all net tuition levels displayed in the graph. Thus if two youth have the same beliefs but different access to resources, their probability of enrollment will still be different. Likewise, if their access to resources is the same but beliefs differ, their probability of enrollment also differs.

Figure 3.4 shows that conditional on enrolling, probability of continuation differs by grade revelation. This illustrates how learning affects one's continuation decision. After a certain belief threshold, higher grades thus lead to an increase in one's probability of continuation. The large difference in continuation probability between high grades and medium grades diminishes as a youth become more optimistic.

Figure 3.5 takes probability of obtaining a degree and shows that even though the effect of net tuition is somewhat more muted than in Figure 3.3, net tuition and subjective beliefs about being a high-scorer still affect one's probability of obtaining a degree.

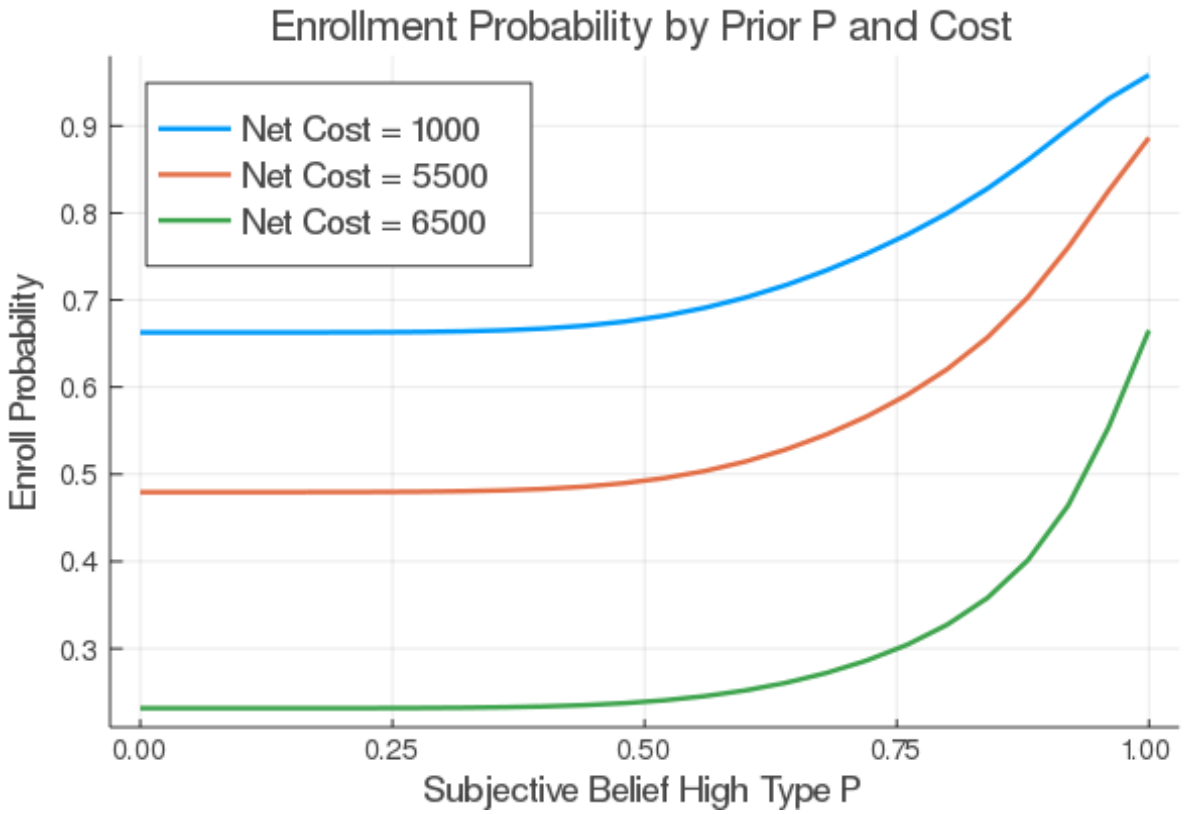

Figure 3.3: Model predicted probability of college enrollment by net tuition and prior subjective belief of being a high-scorer.

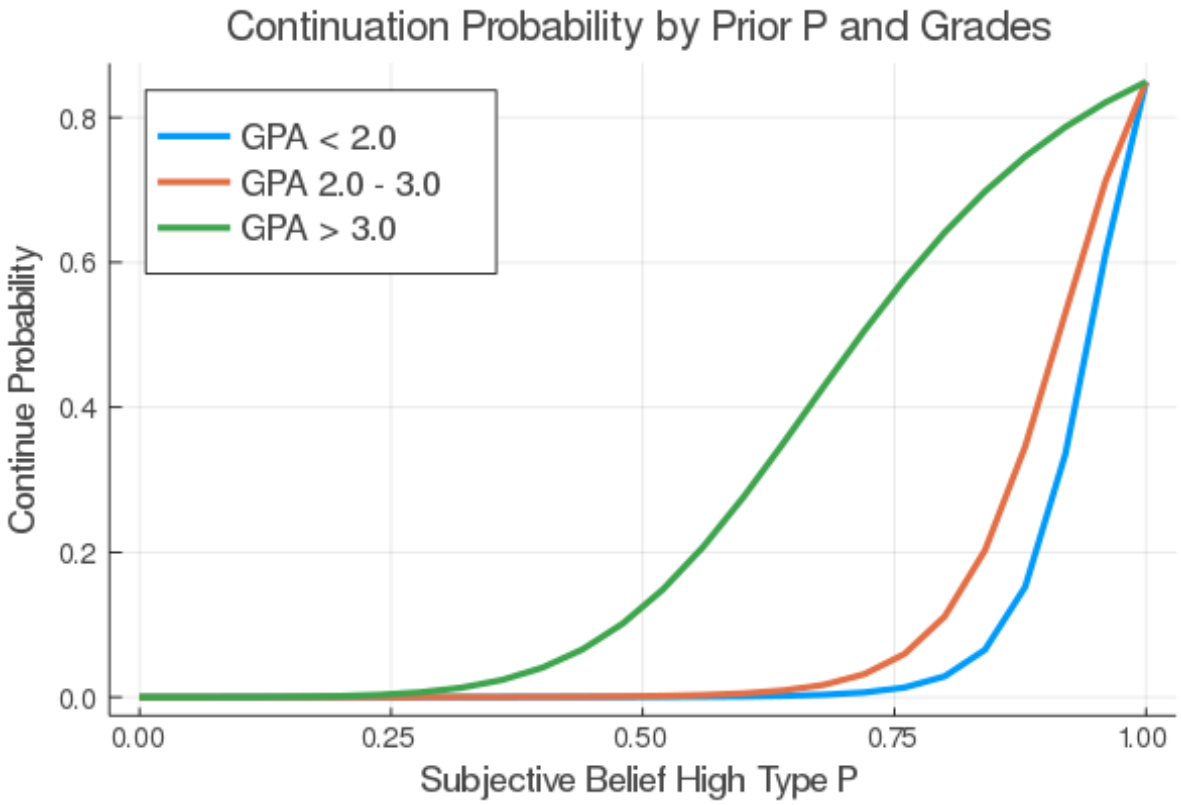

Figure 3.4: Model predicted probability of college continuation by average GPA realized before the second stage after the first stage.

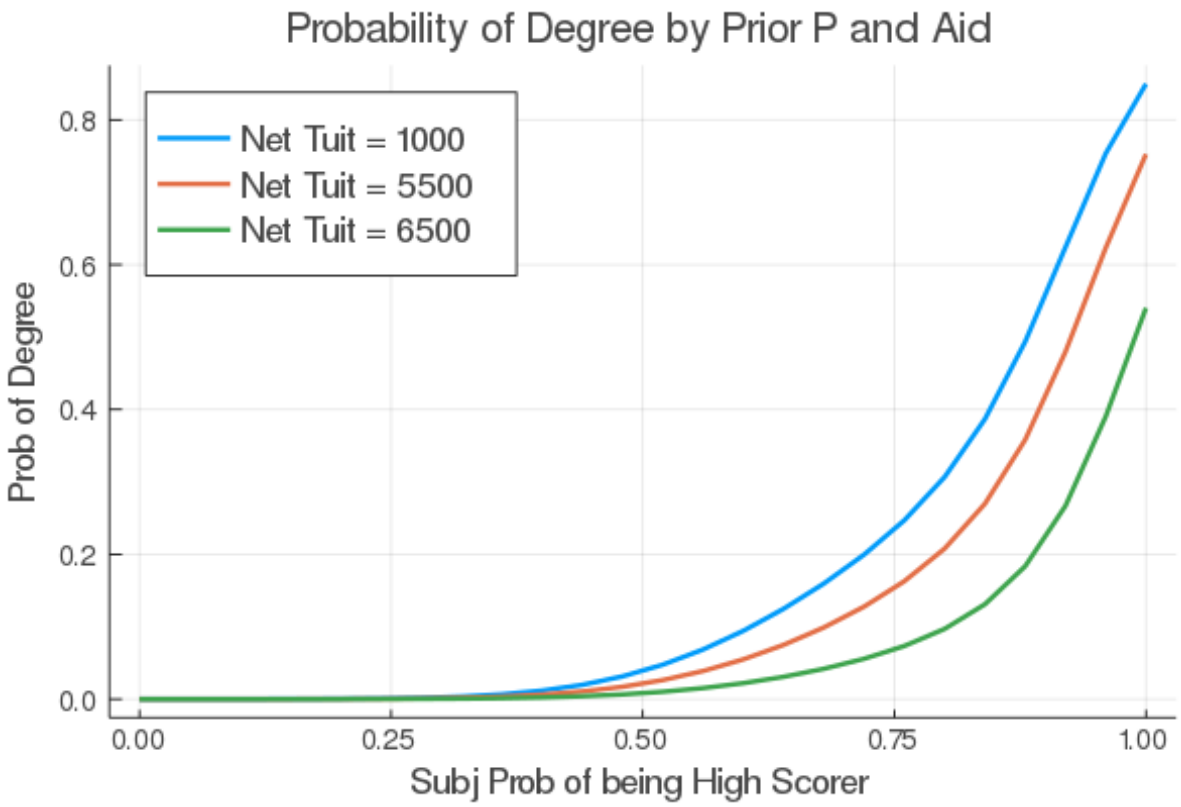

Figure 3.5: Model predicted probability of bachelor's attainment by net tuition.

3.4 Estimation of Quantitative Model

In this section I discuss how I identify and estimate the parameters of the structural model described in section 3. Specifically, I describe some of the assumptions governing the distribution of earnings, financial assistance, and probability of being a high type, as well as parameters whose values will be set outside of the estimation routine. I discuss what moments are used to identify parameters related to the distribution of beliefs about one's type.

Table 3.4: Preset Parameters prior to Estimation

Parameter	Set Value	Description
β	0.94	Discount rate
γ	2.0	Coeff. of Rel Risk Aversion
$(1+r)$	β^{-1}	Int rate
T	24	Number of periods representing two years
$B_{c,1}$	\$16,600	College Borrowing limits pd 1
$B_{c,2}$	\$35,600	College Borrowing limits pd2

Table 3.4: Table of Preset Parameters.

3.4.1 External Parameters

The parameters I set outside of the model are given in Table 3.4. The coefficient of relative risk aversion γ, the discount factor β, and the interest rate $(1+r)$ are set to standardly assumed values. The college borrowing limits are set to match average student debt levels as in Abbot Gallipoli, Meghir, and Violante 2016.

The first stage borrowing limit while in school is set to \$16,600 in 2017 dollars. The second period borrowing limit is set to \$31,100. Together these match average borrowing for the first two years and last two years of college respectively (Wei and Skomsvold, 2011). In total the amount students are allowed to borrow in the model is higher than the highest cumulative total that students could borrow from Federal student loan programs for a bachelor's degree, \$46,000, which likely reflects the use of private loans amongst some students (Lochner and Monge Naranjo 2010).

Financial assistance is estimated outside of the model. The distribution of financial assistance is assumed to follow a log normal distribution, of the form below, where parameters are estimated by OLS.

$$\ln(f_{i,k}) = X_i\beta_{f,k,} + \beta_{f,y} birthyear + \epsilon_{f,k,i} \tag{8}$$

Where X_i includes demographic variables like race, ethnicity, gender, household net worth, parental education, and a constant term. The subscript k indicates that Equation 9 above is estimated separately for family assistance $k = 1$ and government/college financial assistance $k = 2$. To get total financial assistance, the sum of both predicted values for students is used. Therefore financial assistance used in the model is the predicted value given by demographic and socioeconomic variables (Hai & Heckman 2017).

The distribution of latent type τ by demographic group will be estimated using a finite mixture model (FMM). The latent variable will take two values for $\tau_i \in \{\tau_l, \tau_h\}$, respectively corresponding to low-scorers and high-scorers in the rest of the paper. The effect of being τ_l is normalized to 0. The effect of being τ_h will be

determined through the estimation of the three following measurement equations in the finite mixture model.

$$(9) \qquad Z^*_{i,j} = \alpha_{z,j} 1(\tau_i = \tau_h) + \varepsilon_{z,j} \qquad j \in \{1, \ldots, J_c\}$$

$$(10) \qquad \ln w^*_{i,s} = \mu_{w,0} + \mu_{w,1} 1(s \in (12,16)) + 1(s \geq 16)(\mu_{w,2} + \mu_{w,h} 1(\tau_i = \tau_h)) + \varepsilon_{w,s}$$

$$(11) \qquad \pi(g, \tau) = \frac{exp(\gamma_{g,0} + \gamma_{g,\tau} 1(\tau_i = \tau_h))}{\sum_{k=l,m,h} exp(\gamma_{k,0} + \gamma_{k,\tau} 1(\tau_i = \tau_h))}$$

In equation (9) $Z^*_{i,j}$ are measures of cognitive and non cognitive ability. The measures of cognitive ability are the ASVAB scores for arithmetic reasoning, paragraph comprehension, word knowledge and mathematical knowledge. The non cognitive measures are participation in adverse behavior at young ages; sex before age 15 as well as any violence and any theft greater than $50 at the start of the survey. To incorporate both binary and continuous variables the specification below for $Z^*_{i,j}$ will be estimated in the FMM. The choice of human capital measurements and the specification for $Z_{i,j}$ follows Hai and Heckman 2017.

$$Z_{i,j} = \begin{cases} Z^*_{i,j} & \text{if } Z^*_{i,j} \text{ is continuous} \\ \mathbf{1(Z^*_{i,j})} & \text{if } \boldsymbol{Z^*_{i,j}}, \text{ is binary} \end{cases} \qquad i \in \{c, n\}$$

Log earnings dependent on years of schooling s for individual i are described in equation (10) by $\ln(w_{i,s})$. The variance of the error term is allowed to differ for whether a student has no college experience $s \leq 12$, some college experience $s \in (12, 16)$, or a bachelor's degree $s \geq 16$.

Additionally the distribution of grades $g \in \{g_l, g_m, g_h\}$ for low ($GPA < 2.0$), medium ($2.0 \leq GPA < 3.0$), and high ($3.0 < GPA$), conditional on τ is estimated using equation (11) above.

The distribution of type will also be important for the effect of policies targeting by ability as discussed later in the paper. This is described fully by $P(\tau_h; \vec{X}_i) = Prob(\tau_i = \tau_h | \vec{X}_i)$ in equation 12 below. Since $P(\tau_l; \vec{X}_i) = 1 - \ Prob(\tau_i = \tau_h | \vec{X}_i)$.

$$(12) \qquad P(\tau_h; \vec{X}_i) = Prob(\tau_i = \tau_h | \vec{X}_i) = \frac{exp(\vec{X}_i \vec{\beta}_p)}{1 + exp(\vec{X}_i \vec{\beta}_p)}$$

Using equations (9)-(12), human capital measurements, earnings, and grades from the NLSY97, the finite mixture model can be estimated using the individual likelihood function given by $f(\vec{Z}_i, w_i, g_i; \tau_k, X_i, s)$. These parameters in (9)-(12) are estimated by solving for the maximum likelihood given below in equation (13). For more detailed information regarding the functional form of the likelihood function

as well as the parameter results of the individual likelihood function see Appendix A.3-A.4.

$$(13) \qquad \max \quad \sum_i \ln[P(\tau_h; \vec{X}_i) f(\vec{Z}_i, w_i, g_i; \tau_h, s_i) + (1 - P(\tau_h; \vec{X}_i)) f(\vec{Z}_i, w_i, g_i; \tau_l, s_i))]$$

After estimating financial assistance and the finite mixture model, I use the sum of the predicted financial assistance variables for total financial assistance, and predicted earnings from $\ln w_{i,s}$ for $w_n, w_s, w_c(\tau_l), w_c(\tau_h)$[11]. I use the finite mixture model $\pi(g, \tau)$ for the conditional grade probabilities that are used as signals and determine grade realizations. The individual probability of being a high-scorer that I use, $P_{\text{true},i}$, is explained below in equation (14).

$$(14) \qquad P_{\text{true},i} = Prob(\tau_i = \tau_h | \vec{X}_i, \vec{Z}_i, w_i, g_i, s_i) \propto P(\tau_h; \vec{X}_i) \times f(\vec{Z}_i, w_i, g_i; \tau_h, s)$$

$P_{\text{true},i}$ is therefore the posterior probability of being a high-scorer, given education outcomes, earnings, grades, and human capital measures estimated from the finite mixture model. $P_{\text{true},i}$ will be used to simulate high types and low types in the quantitative model. Given the simulated type the appropriate $\pi(g, \tau)$ will be used to generate grades for those missing grades.

3.4.2 Internally Estimated Moments

The remaining parameters that are estimated are the sticker price of tuition for stage 1 and stage 2, $tuit_1$, $tuit_2$, the distribution of subjective beliefs of being type τ_h, the non-pecuniary utility that depends on type, $\mu_c(\tau_i)$, as well the distribution of non-pecuniary utility shocks. The distribution of non-pecuniary utility shocks is given by the type I extreme value draws whose location parameters differ for White, Black, and potential first generation students. The scale parameter for the type 1 extreme value shocks are allowed to differ by stage.

The distribution of subjective beliefs of being high type is given below by equation (15) where values are truncated at zero and one given below.

$$(15) \qquad p_i = \gamma_{p,0} + \gamma_{p,b} CollBelief + \gamma_{p,h} Pedu_{\text{hsg}} + \gamma_{p,s} Pedu_{\text{scol}} + \gamma_{p,b} Pedu_{\text{bach}} + \epsilon_{p,i}$$

The assumption used in equation (14) is that data contained in the variable $CollBelief$ which is equivalent to College Outcome Belief in Table 3.1 and 3.3 from the NLSY97, is a noisy measurement of the subjective belief of being type τ_h. The measurement error is allowed to differ by parental education. This is to capture information about college that youth may receive from their parents higher education experiences. A truncated normal is used since we want to allow for one's and zero's

[11] Earnings and financial assistance are set to 2017 dollars

since these imply certainty of type. Thus these beliefs are not amenable to change with grades.

The distribution of type 1 extreme value shocks, non-pecuniary utility by type $\mu_c(\tau_i)$ and the parameters in equation (15) will be internally estimated by indirect inference. Standard errors for the parameters will be estimated by boot strapping. The moments that will be targeted in the indirect inference specification are the coefficients for the following two regressions in equation (16) and (17).

$$(16) \quad Enroll = \beta_{E,0} + \beta_{E,B} HighBelief + \beta_{E,F_2} T2(Finaid) + \beta_{E,F_3} T3(Finaid)$$
$$+\beta_{E,1G} FirstGen + \beta_{E,W} White + \beta_{E,H} Hisp + \varepsilon_{E,i}$$

$$(17) \quad Continue = \beta_{C,0} + \beta_{C,G_m} GPA_m + \beta_{C,G_h} GPA_h + \beta_{C,F_2} T2(Finaid) + \beta_{C,F_2} T3(Finaid)$$
$$+\vec{\beta}_{C,PH} Pedu_{\text{hsg}} + \vec{\beta}_{C,PS} Pedu_{\text{scol}} + \vec{\beta}_{C,PB} Pedu_{\text{bach}} + \beta_{C,W} White + \beta_{C,H} Hisp + \varepsilon_{C,i}$$

Where $FirstGen$ is an indicator for being a first generation student, $HighBelief$ is an indicator for being in the top half of belief distribution, $T2(Finaid), T3(Finaid)$ are indicators for being in the 2nd and third terciles of the total financial assistance distribution.

The specific problem that will be solved is given below, in equation (17). The parameter vector Γ are those parameters that minimize the difference between the simulated regression coefficients and data regression coefficients. The vector $\tilde{\beta}(\Gamma)$ is the vector of simulation coefficients given Γ, while the vector $\vec{\beta}$ is the vector of regression coefficients from the data. The weighting matrix is given by W which is the inverse of the diagonal matrix of the standard errors from the data regression coefficients.

$$(17) \qquad \min_{\Gamma} (\tilde{\beta}(\Gamma) - \vec{\beta})' W (\tilde{\beta}(\Gamma) - \vec{\beta})$$

Using the calibrated and preset parameters we can then decompose high-scorer inequality by differences in financial aid, subjective beliefs, and non-pecuniary utility. Overall gaps will also be determined by $P_{true,i}$. We can then evaluate the effects of policies on inequality and mismatch in higher education by race, ethnicity and parental background.

3.4.3 Identification Discussion

This section briefly discusses the identification strategy used to choose the targeted moments to estimate the parameters. For a quick reference see Table 3.5.

Equations (16) and (17) essentially match the two main stages of the model where education choices are made. This is stage 1, the enrollment vs work choice and

stage 2, the continuation vs exit and work stage. The main parameters of interest in this estimation are the distribution of beliefs about type that is given by equation (15). Estimation is aided through the external estimates of earnings by schooling choice and type, as well as the conditional grade probabilities given type.

Beliefs given by p_i only matter to the extent that utility from completing college for high-scorers is greater than utility from completing college for low-scorers. The importance of beliefs also depend on relative utility of non college and some college. All of these depend on $w_c(\tau), w_s, w_n$, which is externally estimated. The difference in utility from college between low and high types is also determined by $\mu_c(\tau)$. The difference in expected utility between school and work is also determined by the location difference of type I extreme value shocks for school and work.

If the difference in utility between school and work,[12] is such that work is always preferred, or college is always preferred, then we would have trouble matching some of the patterns between beliefs, grades, and outcomes observed in the data. If type dependent non pecuniary utility $\mu_c(\tau)$, is such that there is no difference in utility between high and low scorers than we would have the same problems matching patterns in the data. This restricts these parameters to be such that there is an effect of measured beliefs and grades.

[12]College minus work type I extreme value shocks

Table 3.5: Identification Strategy

Parameter	Parameter Description	Target	Target Description
$\gamma_{p,0}$	Belief Constant	$\beta_{C,0}, \beta_{C,G_m}, \beta_{C,G_h}$	Constant, Coefficient med, high GPA on continuation
$\mu_c(\tau)$	Type dependent non pecuniary utility	$\beta_{C,0}, \beta_{C,G_m}, \beta_{C,G_h}$	Constant, Coefficient med, high GPA on continuation
$\gamma_{p,b}$	Belief: Meas Belief	$\beta_{E,B}$	Coefficient Meas Belief on enrollment
$\gamma_{p,h}$	Belief: Parent Education HSD	$\beta_{C,PH}$	Coefficient $Pedu_{hsg}$ on continuation
$\gamma_{p,s}$	Belief: Parent Education SCOL	$\beta_{C,PS}$	Coefficient $Pedu_{scol}$ on continuation
$\gamma_{p,c}$	Belief: Parent Education Bach	$\beta_{C,PB}$	Coefficient $Pedu_{bach}$ on continuation
$\mu_{d,0}$	Non-Pec Util: Black 1st Gen Col Stud	$\beta_{E,0} + \beta_{E,1G}$	Constant and $FirstGen$ Coefficient on enrollment
$\mu_{d,C}$	Non-Pec Util: Col Educated Parents	$\beta_{E,0}$	Constant Coefficient on enrollment
$\mu_{d,W}$	Non Pecun Util: White	$\beta_{E,W}, \beta_{C,W}$	$White$ Coefficient on enrollment,continuation
$\mu_{d,H}$	Non Pecun Util: Hispanic	$\beta_{E,H}, \beta_{C,H}$	$Hisp$ Coefficient on enrollment,continuation
$tuit_1$	Tuition Pd 1	$\beta_{E,F_2}, \beta_{E,F_3}$	$T2(Finaid), T3(Finaid)$ Coefficient on enrollment
$tuit_2$	Tuiton Pd 2	$\beta_{C,F_2}, \beta_{C,F_3}$	$T2(Finaid), T3(Finaid)$ Coefficient on continuation

Table 3.5: Identification of Model Parameters and Targeted Moments.

Given these restrictions on non pecuniary utility, identification of beliefs depends on two crucial features of the data. One is that enrolling is positively correlated with measured beliefs in the data as captured by $\beta_{E,B}$, controlling for access to resources. The second is the difference in college continuation by GPA category. This is given by β_{C,G_m} and β_{C,G_h}, as well as the constant term in continuation $\beta_{C,0}$. We can also see in Panel 1 of Figure 3.6 that high and low grades do provide strong signals of type. For medium grades this is less so.

If we focus on the enrollment stage and equation (16) $\gamma_{p,b}$ in (15) is primarily identified through $\beta_{E,B}$ in (16). Since this determines how important measured beliefs are in enrollment which enters the model through subjective beliefs about type.

Panel 2 in Figure 3.6 shows the updated belief given the type-dependent grade probabilities in Panel 1. Figure 3.6 shows that grades do provide a signal of type showing that there should be a differential response in non-continuation of grades.

The level of beliefs given through $\gamma_{p,0}$ is identified through difference in response to GPA. Therefore the degree to which grades affect updating and hence continuation depends on the location of the distribution of the prior. If estimated

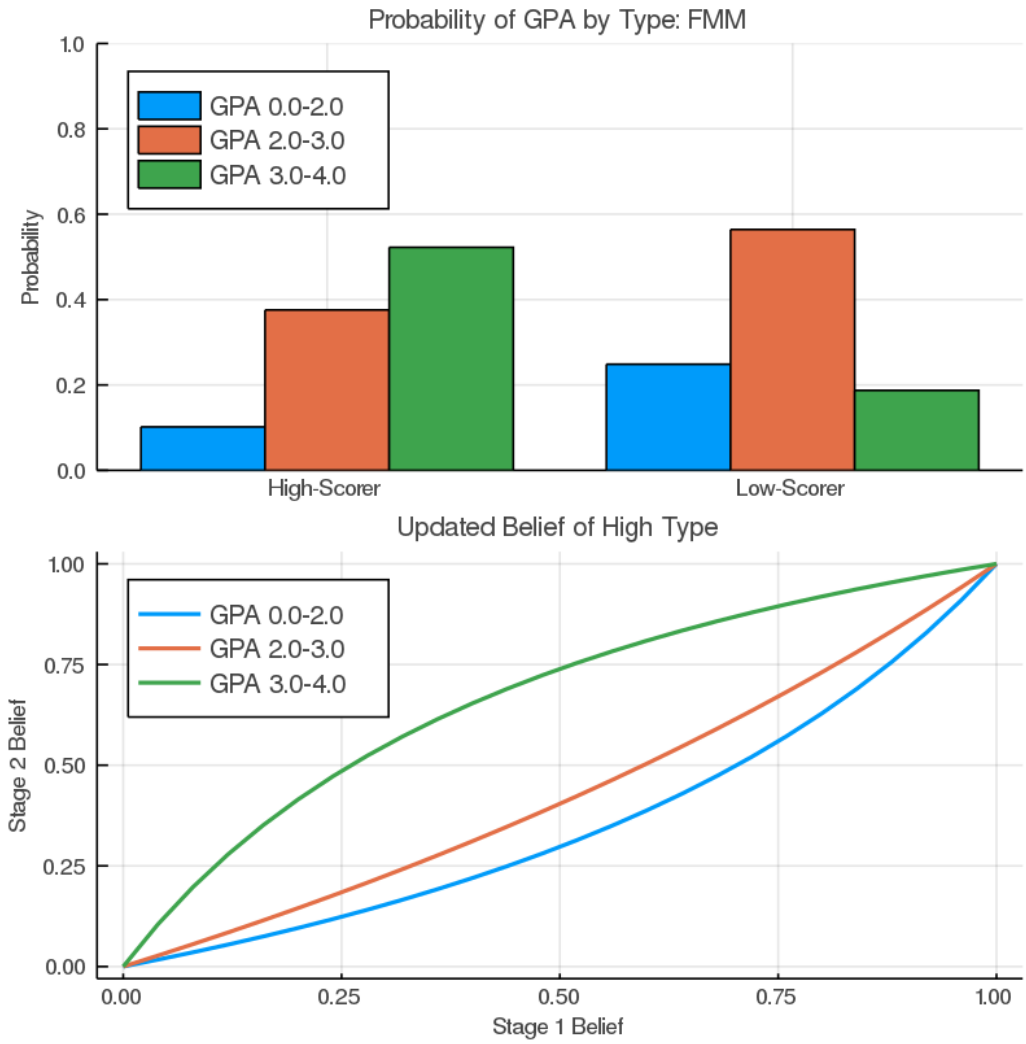

Figure 3.6: Grades by latent scorer type, and update rule by initial prior.

beliefs are located near the center of $(0, 1)$ then here changes in beliefs will lead to the biggest updates and hence biggest grade response as suggested by Figure 3.6 Panel 2. Therefore $\gamma_{p,0}$ will be set to where this best matches equation (17) from the data.

Responses to financial aid in enrollment and continuation given by $\beta_{E,F_2}, \beta_{E,F_3}, \beta_{C,F_2}, \beta_{C,F_3}$ will identify $tuit_1$ and $tuit_2$. This is because financial assistance is externally estimated and $tuit_1$ and $tuit_2$ will set net tuition rates by demographic group which also play an important role in the higher education decision given by the quantitative model.

Differences in the location parameter by race and ethnicity will be identified through the effect of race and ethnicity in equation (15) and (16), given by $\beta_{C,W}, \beta_{C,H}, \beta E, W, \beta E, H$. The effect of being a first generation college student on the difference in the location parameter is identified through $\beta_{E,1G}$. The effects of parental education on beliefs are identified by $\beta_{C,PH}, \beta_{C,PS}, \beta_{C,PB}$ in equation (17).

The variance on the unobserved portion of belief in equation (15), the period

specific scale parameters for the type I extreme values, and the period constant location parameter for the type I extreme value shocks, would help match the levels of enrollment and continuation, as well as create extra variation needed to fit the data. The type dependent non-pecuniary utility, $\mu_c(\tau)$ helps to adjust response to grades if the response implied by the finite mixture model through earnings and $\pi(g_k, \tau_j)$ is too restrictive. In total there are 16 parameters that are estimated by 17 moments.

Table 3.6: External Estimation Results: Average Earnings

Parameter	Estimated Annual Value	Description
w_n	$\$29,584$	Non College Earnings
w_s	$\$45,026$	Some College Earnings
$w_s(\tau_l)$	$\$51,277$	Low type college earnings
$w_s(\tau_h)$	$\$65,841$	High type college earnings

Table 3.6: Mean Estimated Earnings from Finite Mixture Model.

3.4.4 External and Internal Estimation results

This section discusses some of the main results from the internal and external estimation of the quantitative model. For the full results of the financial assistance estimates, the finite mixture model, and the indirect inference specification see appendix A.4 and A.5.

Table 3.6 shows the estimated model earnings from the results of the log earnings equations of the finite mixture model. We see that regardless of type, annual earnings increase with education. As expected enrolling and completing school will lead to higher earnings for all youth, regardless of scorer type. However high-scorers have higher earnings than low-scorers upon completing college.

If there were no non-pecuniary utility and credit constraints, then all youth would choose to enroll and complete college. However in the presence of binding credit constraints the lower utility from low consumption for the first two periods may deter some youth from pursuing education. This is especially the case if they believe they will incur some non-pecuniary utility costs from being a low-scorer as well.

Table 3.7: Key Internal Parameter Results

Parameter	Description	Estimate
$\gamma_{p,0}$	Belief Constant	0.0057
		(0.0133)
$\gamma_{p,b}$	Belief: Meas Belief	0.88***
		(0.0103)
$\gamma_{p,h}$	Belief: P-Edu HSD	0.026**
		(0.0116)
$\gamma_{p,s}$	Belief: P-Edu SCOL	0.028***
		(0.0103)
$\gamma_{p,c}$	Belief: P-Edu Bach	0.055***
		(0.0102)
$\mu_{d,0}$	Non Pecun Util: Black 1st Gen Col Stud	-0.000056
		(0.000044)
$\mu_{d,C}$	Non Pecun Util: Col Edu Parents	0.00004
		(0.000037)
$\mu_{d,W}$	Non Pecun Util: White	0.000017
		(0.000028)
$\mu_{d,H}$	Non Pecun Util: Hispanic	0.000023
		(0.000034)
$\mu_c(\tau_h)$	Non Pecun Util high	0.00052***
		(0.000065)
$\mu_c(\tau_l)$	Non Pecun Util high	-0.0028***
		(0.00031)
$tuit_1$	Tuition Pd 1	\$7583.61***
		(120.5)
$tuit_2$	Tuiton Pd 2	\$6972.45***
		(16.05)

Boot strapped standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.7: Internally Estimated Parameters with Bootstrapped Standard Errors.

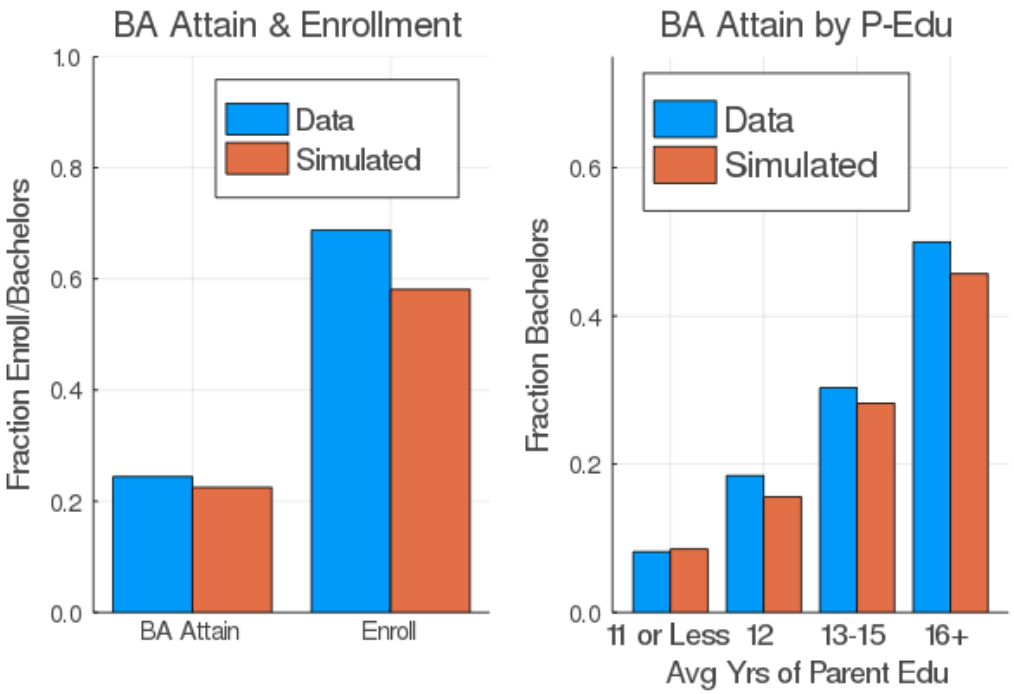

Figure 3.7: Model Fit: Enrollment, Bachelor's Attainment by Parent Edu.

Table 3.7 shows several of the key parameters that were estimated in the internal calibration exercise. The coefficient on self-reported probability of degree attainment, is 0.87 with a very precise standard error estimate. This suggest that this variable does capture beliefs about being a high-scorer with $\tau_i = \tau_h$. Holding the measured belief constant as well, the higher education background a youth comes from the more optimistic they are that they are type τ_h. This is consistent with the hypothesis that youth who know more adults with college education will rate their college ability higher and perhaps closer to the truth if they are high-scorers.

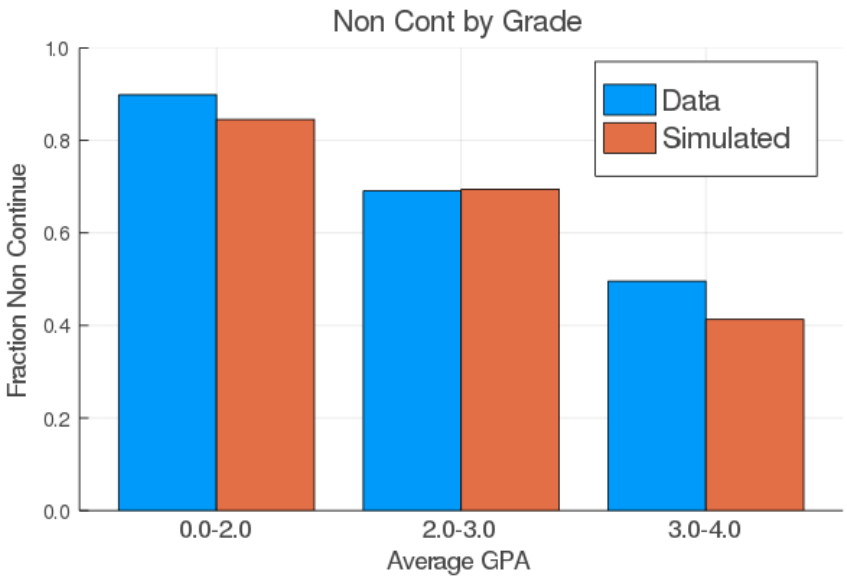

Figure 3.8: Model Fit: Non Continuation by Grade

Figures 3.7-3.9 provide a quick snapshot of how well the model matches patterns we see in the data. Figure 3.8 and the left side graph of Figure 3.7 show that the model slightly underestimates enrollment and non completion. However on balance it has a good fit with regards to BA attainment. As we can see from Figure 3.9 and the left side of Figure 3.7, this success at capturing BA attainment carries over when we condition by demographic group as well. The quantitative model matches gender and household net worth bachelor's attainment even though these were not directly targeted in the indirect inference specification.

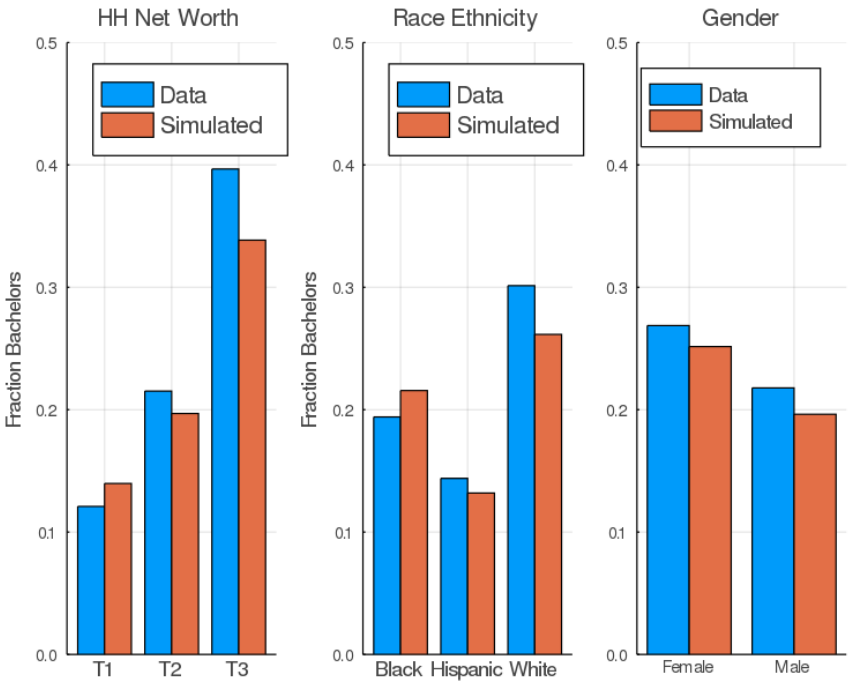

Figure 3.9: Model Fit: Bachelor's Attainment by Demographics

3.5 Quantitative Results

In this section I use the estimated quantitative model to answer two questions. The first is, for high scorers, how much of the gap in bachelor's attainment rates relative to high-SES White youth is explained by differences in beliefs and financial assistance? The second question is, will a policy that addresses these disparities by targeting information and funding to high scorers from low-SES backgrounds be more efficient at closing overall bachelor's attainment gaps[13] than universal policies such as free college for all or providing better information to everyone in the United States.

For both questions the main outcome of interest, bachelor's attainment gaps, is defined as the difference in bachelor's attainment rates between high-SES White youth versus the three comparison groups, Black, Hispanic, and low-SES youth[14]. For the first question inequality is measured within high-scorers only. Where high scorers are those simulated by the model, whose realizations depend on human capital measures, earnings, and grades. For the second question inequality is measured independent of scorer type.

In this section low-SES youth, are those whose household is in the bottom tercile of the net worth distribution or whose parents have a high school diploma or

[13]gaps independent of scorer type relative to high-SES White youth.

[14]Black and Hispanic youth includes youth from all socioeconomic backgrounds. Low-SES youth includes youth from all racial and ethnic groups in the sample

less. High-SES youth are those whose household is from the top tercile of the wealth distribution and whose parents have at least a bachelor's degree. Before discussing the main results of this paper I discuss the estimated information frictions and mismatch present in the baseline version of the model.

3.5.1 Information Frictions and Mismatch

In this section I discuss information frictions and mismatch by scorer type, with some discussion on how this differs by demographic group. I also explain how this mismatch can help us predict the effect of policy on inequality.

In the model subjective beliefs can differ with respect to $P_{\text{true},i}$, which is how much they differ from a rational expectations prior. Subjective beliefs can also differ from the truth, which is the actual type of the agent.

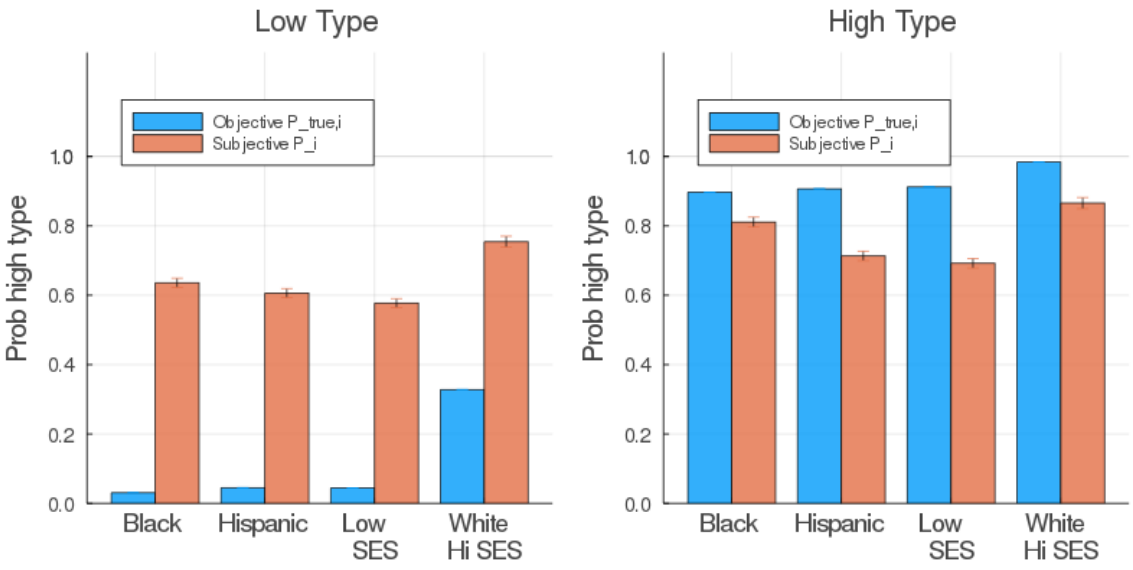

Figure 3.10: Information Friction: Objective vs Subjective Probability of High Type

Differences relative to $P_{\text{true},i}$ will determine the effects of policy providing more accurate estimates of P_{true} to youth. While differences in beliefs relative to the youth's actual type will affect the measure of efficiency used in this model, mismatch. In this analysis, mismatch is defined as the percentage of youth who would change their decision to get a bachelor's or not, if they knew their type with complete knowledge.

Figure 3.10 shows the difference in mean subjective beliefs vs estimated $P_{\text{true},i}$ by demographic group and scorer type. We see that for Black, Hispanic, low-SES, and high-SES White youth subjective beliefs are on average inaccurate compared to those estimated from the data. High-scorers are too pessimistic and low-scorers are too optimistic on average. On average Black, Hispanic, and low-SES high-scorers know something about their type since their beliefs are more optimistic than low-scorers. For high-SES White youth beliefs are almost the same between low and high-scorers.

High-scorers are also closer to the truth than low-scorers for all demographic groups under consideration. Therefore we should expect that policies revealing estimates of $P_{\text{true},i}$, like the universal information policy and the targeted policy, will have different effects by type. For instance universal information should lead to a bigger readjustment of low-scorers' beliefs than for high-scorers' beliefs. As a result this can lead to a bigger decline in bachelor's attainment from low scorers than the increase in bachelor's attainment from high-scorers. Additionally if there are more low scorers than high scorers among Black, Hispanic, or Low SES youth, then this can generate more inequality.

For the targeted policy that provides information only to low-SES high scorers, we should see that it should close gaps to low-SES youth more than for Hispanic and Black youth. This is because Black and Hispanic youth benefit only to the extent that they are also low-SES high scorers. Most importantly, the difference in beliefs with respect to $P_{\text{true},i}$ is larger for low-SES youth than for Black and Hispanic high-scorers.

Figure 3.10 can also help us predict the effect of free college for all, a policy that does not address beliefs but reduces net tuition for everyone. Since in figure 10 low-scorers are overly optimistic, we should see that increasing funding to everyone will likely lead more low-scorers to enroll as well as some high scorers. This may increase over investment from low-scorers and perhaps mismatch as well.

Next Figures 3.11-3.12 show what education decisions are in the baseline versus what they would be if agent's knew their type with certainty. Hence they show mismatch. The top panel in Figure 3.11 shows the bachelor's attainment rate of High-scorers in the baseline scenario and under complete information about type by demographic group. The first thing to notice is that there is substantial underinvestment among all high-scorers. However, this is less the case for high-SES White youth.

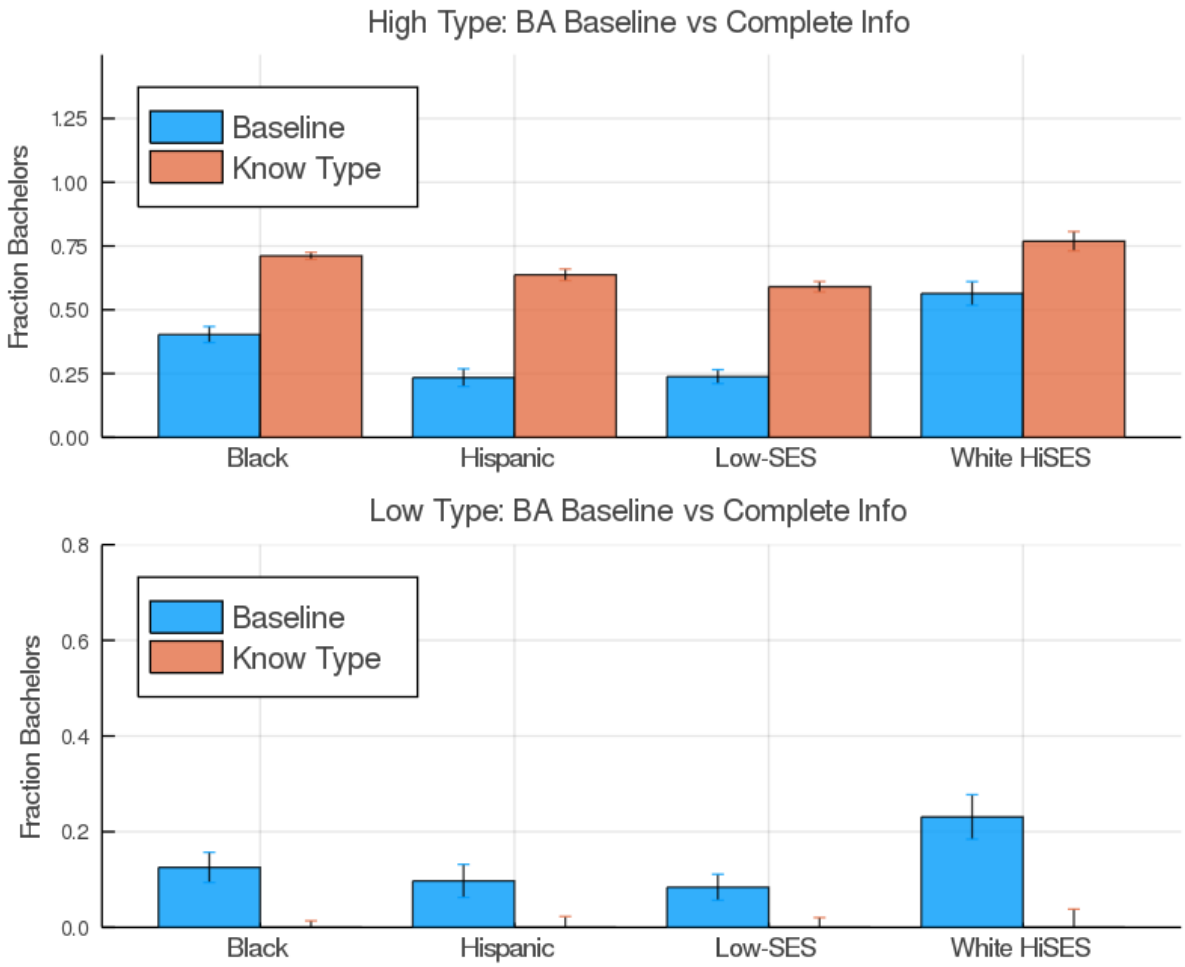

Figure 3.11: Inefficiency from Info Friction: Mismatch by Type Under Complete Info

The bottom panel in Figure 3.11 shows the bachelor's attainment rate of low-scorers in the baseline scenario and under complete information by demographic group. Conversely there is over investment occurring in the higher education market for low-scorers from all demographic groups. This over investment is highest for high-SES White low-scorers.

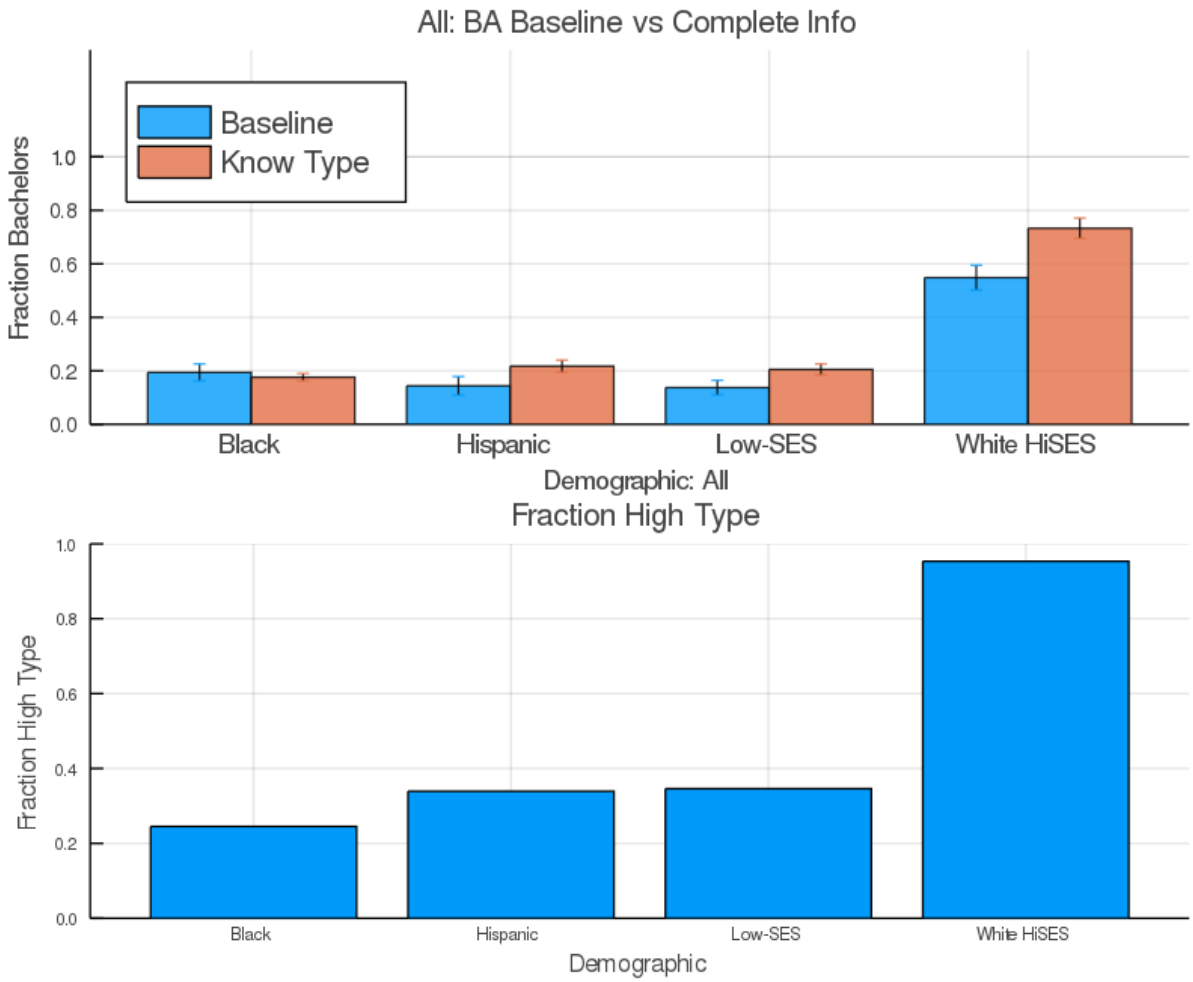

Figure 3.12: Aggregate Mismatch by Type and Proportion of High Type by Group.

Finally the top panel in Figure 3.12 shows the aggregate effect, independent of type, of knowing type with certainty. This aggregate effect of having complete information depends on the proportion of high-scorers within the demographic groups considered as shown in the bottom panel of Figure 3.12.

Figure 3.12 suggests that independent of type, levels of mismatch are actually higher for high-SES White youth. We can also see that for Black youth there is little change in bachelor's attainment, and for the rest there are increases in bachelor's attainment. Since high-SES White attainment increases the most, complete knowledge of type might actually increase inequality, despite the gains in attainment for Hispanic and low-SES youth.

Relaxing the rational assumptions prior common in the literature allows for a more accurate estimation of mismatch as well as the results of providing information. What Figure 3.11 and 3.12 show is that if rational expectations were assumed then the residual dependent on race or dependent on race and ability would have to adjust so that bachelor's attainment matches the baseline. In this case the effect of information would be muted and estimates of mismatch would lower since differences in non

pecuniary utility would play a bigger role in explaining inequality.

In summary the difference of beliefs with respect to $P_{\text{true},i}$ and with respect to the actual individual's type will affect the results of the policy analysis. This will be explored in section 5.3. This is a separate question from the role that beliefs play in explaining gaps in the baseline scenario relative to high-SES White youth. What matters for this question is the differences of subjective beliefs and financial assistance between demographic groups. This will be answered in section 5.2 for high-scorers.

3.5.2 Decomposition

The first question I use the estimated model to answer is, for high-scorers, how much of the gap in bachelor's attainment rates between high-SES White youth versus Black, Hispanic, or low-SES youth, is explained by beliefs? A related question is how much is explained by differences in access to financial assistance?

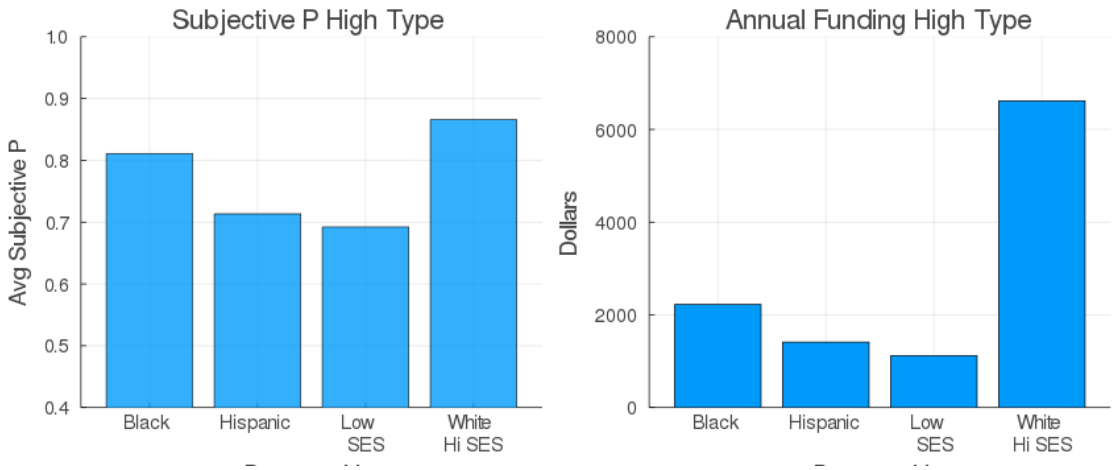

Figure 3.13: Group Difference in Causal Variables: Beliefs and Funding

To answer this question, I sequentially set beliefs of all high scorers to the mean value of high-SES White high scorers, then I set the financial assistance of all high scorers to the mean value of high-SES White high scorers. Since these are all high-scorers, human capital is assumed to be equal in the model. Therefore any remaining gaps are due to differences in non-pecuniary utility, entering the model through the distribution of the type I extreme value shocks.

Figure 3.13 shows mean subjective beliefs about being a high-scorer, and financial assistance by demographic group. Figure 3.13 shows that high-SES White youth not only receive higher levels of financial assistance on average but are also more optimistic on average. Gaps in average beliefs and financial assistance are also smaller between Black and high-SES White youth.

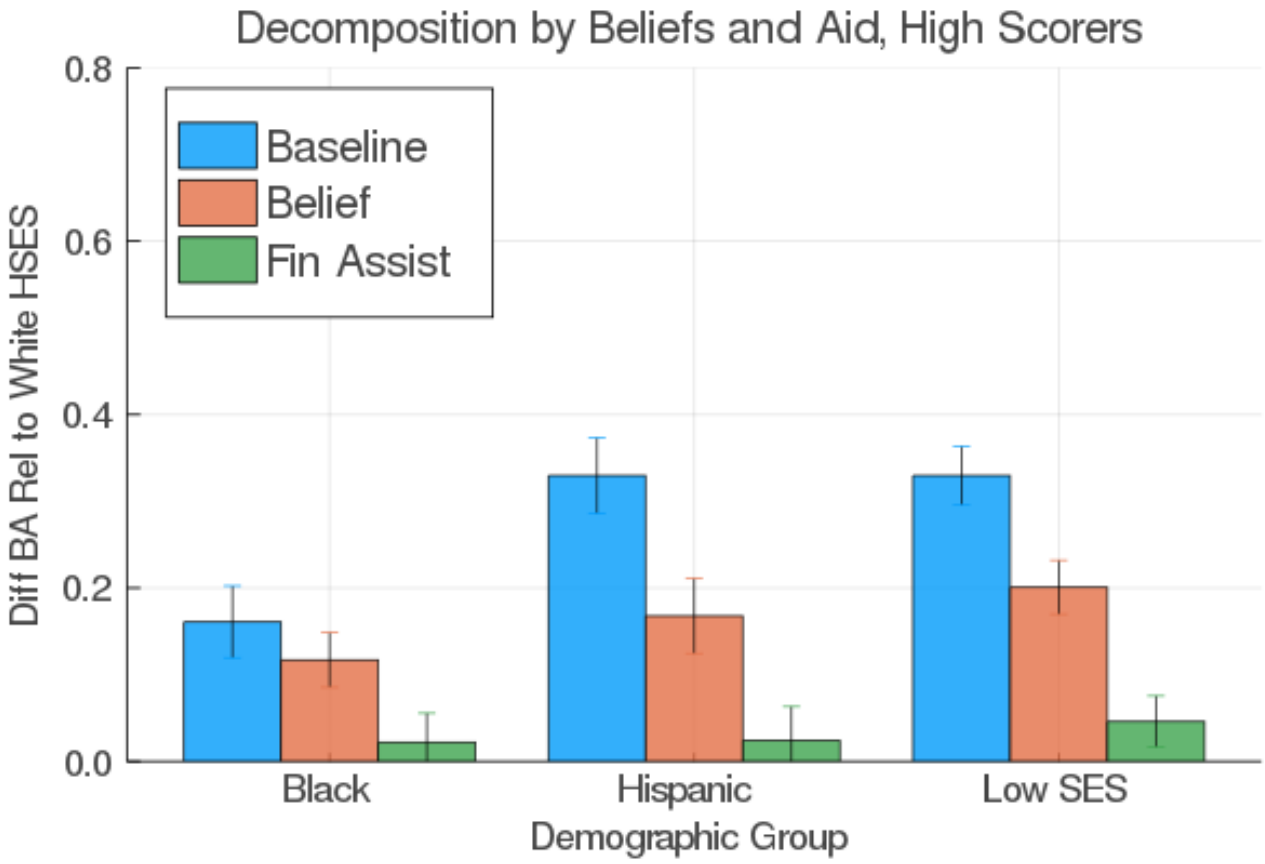

Figure 3.14: Decomposition of Bachelor's Attainment Relative ot White High SES

Figure 3.14 and Table 3.8 show the results of the decomposition exercise. In Figure 3.14, the y-axis shows high-SES White high-scorer bachelor's attainment rate minus the bachelor's attainment rate of the comparison group from the x-axis under the three scenarios in the legend. The rows titled difference in Table 3.8 provide the numerical values and standard errors for the information shown in the graph. The row titled "% Explained" shows the percentage decline in the gap after each step of the decomposition exercise for each of the demographic groups.

Table 3.8: Mechanism Decomposition: High Scorers

Demographic	(1) Baseline	(2) Beliefs Equal	(3) Fin Assist Equal
Black			
Difference	15.8***	10.4	2.6**
	(4.24)	(3.19)	(3.32)
% Explained		33 %	50%***
		(20.4)	(11.22)
Hispanic			
Difference	33***	16.9***	2.2***
	(4.39)	(4.29)	(3.85)
% Explained		49 %***	45%***
		(13.67)	(6.34)
Low SES			
Difference	32.8***	20.5***	5.7***
	(3.39)	(3.13)	(2.96)
% Explained		38%***	45%***
		(10.97)	(6.17)
White High SES Bachelor's attain	56		

Boot strapped standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.8: Decomposition Results of Inequality in Bachelor's Attainment Relative to White High SES

In Figure 3.14 and Table 3.8 we see that at each step of the decomposition exercise gaps are narrowed for each of the three comparison groups. However we would not be able to rule out a statistically zero effect of beliefs for Black high scorers, as shown by the large standard errors in Table 3.8. For Hispanic and low-SES youth however this is not the case. We can reject a null hypothesis that the effect of beliefs

is zero. For these groups beliefs are estimated to explain an estimated 49% of the gap for Hispanic high-scorers, and 38% for low-SES high-scorers.

For all three comparison groups differences in financial assistance are also statistically significant. Financial assistance explains 50% of the Black bachelor's attainment gap, and 45% of the bachelor's attainment gap for Hispanic and low-SES high ability youth. Since ability type is assumed to be equal any remaining difference is due to differences in non pecuniary utility.

The results in this exercise suggests that if Black, Hispanic, or low-SES high scorers are provided with information about their type as well financial assistance then gaps can be narrowed amongst high-scorers. The effect that an intervention like this has on overall inequality regardless of scorer type and how this compares to universal policies will be explored in the next section.

3.5.3 Policy Analysis: Effects on Inequality and Mismatch

In this section I compare the effects of three policies on mismatch and inequality. Inequality is measured by the difference between the reference group, high-SES White youth, and the three comparison groups; Black, Hispanic, and low-SES youth. In this section gaps are measured independent of type. Mismatch takes the form of under investment in college for high-scorers and over investment for low-scorers. Where high and low scorers are simulated by the model. Realizations of being a high or low scorer depend on human capital measures, grades, and future earnings.

The first of the policies under consideration is a targeted policy that provides free college [15] and information about type to low-SES predicted high-scorers. Notice, for the predicted high scorers, we use only information that would be available to school administrators or policy makers before college, like standardized test scores. In this case, ASVAB measures and adverse behavior indicators are used to predict high scorers for the targeted policy.

The last two policies target everyone regardless of SES and predicted scorer type. These two policies are free college for all and providing information about ability type to all. In the targeted and universal policies free college is implemented through increasing financial assistance from government and institutions to cover tuition sticker prices. Family financial assistance is kept constant. Information is provided by revealing estimated $P_{true,i}$ that incorporates information that would be available before college completion. In effect providing information is equivalent to giving everyone rational expectations.

Figure 3.15 and the rows titled "Difference" in Table 3.9 shows the difference in bachelor's attainment rates between high-SES White youth and each of the three comparison groups under each scenario. The row "% Change in Gap Relative to Baseline" shows by what percentage the gap changes after implementation of the policy compared to the Baseline. Negative percentage values indicate that the bachelor's attainment gap shrunk, while positive percentage values indicate that the gap

[15] Takes the form of increasing government and college assistance to cover sticker price of tuition. Family assistance is kept constant.

increased.

We see that among universal policies free college for all decreases inequality for the three comparison groups,where decreases range between 14.7% to 16.9%. Providing better information for everyone actually leads to more inequality where the gap increases at a range of 41.5% to 70%. This is because tracking increases bachelor's attainment for high-SES White youth. Additionally for Black, Hispanic, and low-SES youth, gains in bachelor's attainment from high scorers are offset by decreases in bachelor's attainment rates for low scorers, where low scorers make up a greater share of the population.

Table 3.9: Policy Effect on Overall Inequality

Demographic	Baseline	Free College for All	Info to All	Targeted: Info & Free
Black				
Difference	35.4***	28.95**	60.22***	26.5***
	(3.11)	(3.16)	(3.10)	(3.18)
% Change in Gap Relative to Baseline		-18.3** %	70%***	-25.2 % ***
		(8.59)	(8.43)	(8.65)
Hispanic				
Difference	40.5***	33.6**	57.42***	29.02***
	(3.45)	(2.94)	(3.23)	(3.33)
% Change in Gap Relative to Baseline		-16.9 %**	42%***	-28.26%***
		(7.04)	(7.74)	(7.96)
Low SES				
Difference	41.1***	35.05**	58.2***	23.9***
	(2.69)	(2.71)	(2.95)	(3.08)
% Change in Gap Relative to Baseline		-14.7%**	41.5%***	-41.8%***
		(6.38)	(6.95)	(7.27)
White High SES Bachelor's attain	54.8			

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3.9: Policy Effect on Gap between White High SES and Comparison Group

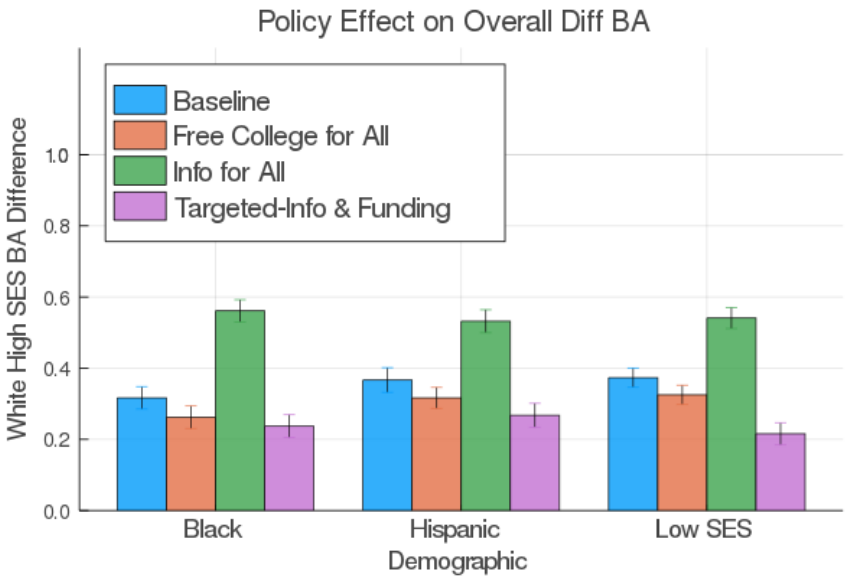

Figure 3.15: Policy Effect on Gap between White High SES and Comparison Group

The targeted policy providing information and funding to low-SES high scorers decreases inequality the most, decreasing gaps between 25.2% for Black youth, 28.3% for Hispanic youth, and up to 41.8% for low-SES youth. The effect of the policy on Black youth and Hispanic youth is less effective than it is on low-SES youth in general. This is because Black and Hispanic youth benefit from the policy only to the extent that they are also low-SES high-scorers. The policy may be strengthened if information and funding is targeted to Black and Hispanic high scorers regardless of SES.

Table 3.10: Mismatch: Percentage of Population Switch with Type Knowledge

Policy	% Pop Mismatched Overall	% Pop Mismatched High-Scorer	% Pop Mismatched Low-Scorer
Baseline	27.1 %	21.3 %	5.8 %
Free College For All	30.5%	21.5 %	9.1 %
Info for All	4.4 %	4.1 %	0.3 %
Targeted: Recruiting	19.1%	13.3 %	5.9%

Table 3.10: Percentage of Population Mismatched by Policy

In Figure 3.15 gaps still exists after all three policies are implemented. This highlights the important role that disparities in early childhood human capital investment still plays in generating inequality. Specifically, even if the targeted policy lead to a 100% bachelor's attainment rate for low-SES high scorers, the fact that discrepancies in early childhood human capital generate a lower proportion of high scorers among low-SES youth, would mean that there would still be inequality in overall attainment.

Finally Table 3.10 shows the amount of mismatch present in higher education and how it is distributed among high-scorers and low-scorers. We see that 27 % of youth would change their college decisions if they knew their type for certain. The second column shows that this is primarily amongst high-scorers who would likely increase their schooling if they knew their type.

When we enact free college for all this increases to 30.5%, with no decrease in under investment of high-scorers, but a larger 3.3% increase in over investment of low-scorers. As expected the tracking system decreases mismatch the most by almost completely removing all mismatch for low-scorers. This is because it brings all youth closer to the truth by revealing $P_{true,i}$.

The targeted policy decreases overall mismatch but primarily through increases in education investments among high-scorers. The percentage of the population that are mismatched and high-scorers decreases by 8 percentage points under the tracking policy.

Together Table 3.9-3.10 shows that if we are interested in policy that decreases inequality with minimal effects on mismatch, then the targeted policy is to be preferred. This is because it not only decreases inequality the most but also decreases mismatch. Providing information increases overall inequality which would make it undesirable if decreasing overall inequality was our main policy objective. Free college for all decreases inequality less effectively than the targeted policy and generates more mismatch as well.

An additional benefit to the targeted policy is that in practice providing subsidies to only a subset of students is likely much less resource intensive than subsidizing college for all youth. Many of these youth might actually already be qualified for free college, so costs may be even smaller than the model would suggest (Hoxby and Avery 2012, and Dynarski, Libassi, Michelmore, and Owen 2017).

Even if the targeted policy is to be preferred, there are still gaps in bachelor's attainment. This means disparities will likely still exist as long as there are differences in early childhood human capital development as well.

3.6 Conclusion

In this paper we investigated the role that beliefs played in generating inequality in higher education outcomes for high-scoring youth. In the NLSY97 we found that holding access to resources, demographics, and measures of human capital constant that being more optimistic regarding degree attainment is associated with higher college enrollment, continuation, and completion. We also found that controlling for human capital measures and access to resources, individual beliefs about own college outcomes are highly correlated with parental education, and percentage of peers with college plans.

In the quantitative analysis I showed that for high-scorers beliefs contribute between 38-49% of the bachelor's attainment gap for Hispanic and low-SES youth, relative to high-SES White high-scorers. Beliefs explain 33% of the gap for Black high-scorers. However, a zero belief effect for Black high-scorers can not be ruled out. I find that in terms of decreasing overall inequality while minimizing mismatch, targeted policies that provide information about ability type and funding to low-SES high-scorers are to be preferred to free college for all and instituting a tracking system in the US. This is because the targeted policy not only more effectively closes gaps, but also decreases mismatch. The other two policies exhibit equity efficiency trade offs, where free college for all decreases inequality and increases mismatch, while tracking increases inequality and decreases mismatch.

Therefore this paper shows that in addition to financial constraints, information frictions lead to high scoring youth from underrepresented backgrounds under investing in education. Because of that representation in higher education can be increased efficiently through more active recruiting along with subsidies for academic high achievers from disadvantaged backgrounds. However because of differences in early childhood human capital development gaps are likely to still persist. Therefore In order to fully close all gaps we must still study the effects of improving K-12 education and household environment, as well as the relationship between human capital investments, belief formation, and information frictions.

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Appendix A

Appendix to Chapters 1 and 2

A.1 Data Construction

The variables used in the analysis are as follows. The measure of socioeconomic status used is household net worth at the start of the survey while agents where between the ages of 13-17 years old. The measure of human capital used is ASVAB AFQT for cognitive human capital and participation in risky behavior to control for non cognitive human capital, commonly associated with social skills and impulse control. Since ASVAB AFQT was only available for the subset of individuals who participated in the ASVAB, ASVAB AFQT was interpolated using middle school and high school grades, as well as controls for demographics, geography, household net worth and participation in risky behavior.

Outcomes examined include bachelor's attainment, worked more than 20 hours in 2010, served in the military, been arrested, been incarcerated or had a child by age 20. Bachelor's attainment was measured by whether an individual had a bachelor's degree or higher by the year 2017. Worked more than twenty hours a week in the year 2010 was defined to equal 1 if total hours worked in 2010 divided by the number of weeks in 2010 was greater than 20 and set to zero otherwise. An agent was said to have served in the military if they served enlisted or commissioned in the Armed Forces, including active, reserve and national guard units. If an agent reported an arrest or incarceration event then they were said to have been arrested or incarcerated. If there was missing data on arrests or incarceration history then the value was set to missing. An individual not missing incarceration or arrest reports that reported zero arrests or incarceration rates was said to not have been arrested or incarcerated.

Having a child by age 20 was set to one if the agent reported having a biological child by the survey year of which they were 18 years old. Variables for participation in risky behavior were calculated similar to Having a child by age 20. Sex by age 15, stole more than 50$ worth of anything by age 18, and committed violence by age 18, were set to one if agents reported a related event by the survey year of which they turned 18 and zero if they did not report and were not missing any data.

Average years of parents schooling is equal to the average of both available parent's years of schooling including adopted parents if biological parents information

was not available. If only a single parent's education is available then average years of parent's schooling was set to the years of schooling of that parent. Average years of parent's schooling was also bottom coded at 8 and top coded at 16. Similarly parent ever served in the military or in jail was set to 1 if there was information of any parent at all that had served in the military or in jail. If the available parents did not have a military history or jail history then the value was set to zero.

Construction of belief variables was complicated by the fact that different year of birth cohorts were asked belief questions and sometimes different versions of said questions in different survey years. All beliefs were recorded by the survey year corresponding to the year of the individual's 18th birthday. Belief of enrollment of college was constructed by combining three belief variables.First for individuals born between 1980-1981 belief of college enrollment was set to equal self reported probability of having a degree by age 30 reported in 1997. For youth born between 1982-1984 belief of college enrollment was set to belief of being in school next year reported in the year 2000 if the individual completed grade 11 and was enrolled in high school or last completed grade 12 and not enrolled in college. Belief of college enrollment was set to belief of being in school in five years reported in the year 2000 if individuals had completed at least 7th grade and at most 10th grade and were still enrolled in K-12. To control for differences in belief measurement used each OLS regression that included belief of college enrollment included a categorical variable indicating type of belief used and year of birth fixed effect.

Probability of working more than 20 hours in the future was set to belief of working more than 20 hours a week when 20 years old reported in 1997 for youth born in 1980 or 1981. For youth born between 1982-1984 belief of working more than 20 years in the future was set to belief of working more than 20 hours a week in 5 years reported in the year. Both of these time frames are well before the year used for the corresponding outcome the year 2010.

Likelihood of joining the military is the 1-5 likelihood scale where 1 means very unlikely and 5 means very likely from the subset of individuals who took the ASVAB. Probability of being arrested, a victim of violence, and being a parent are all reported probabilities of the corresponding event happening next year. Similar to the other belief variables for individuals born in the 1980-1981 cohorts beliefs from the year 1997 were used while for the 1982-1983 cohort beliefs from the year 2000 were used. To control for differences in year when beliefs were recorded year of birth dummies were added to all OLS specifications using beliefs.

The sample was selected by removing individuals who did not identify as being Black, White Non Hispanic, and Hispanic. Finally the sample was restricted to individual's not missing data for any of the covariates. The exception being probability of enrolling in college since high school dropouts and early college attendees were disproportionately missing data due to variable construction. A robustness check that sets the belief equal to zero for individuals missing this variable interacted with and indicator for missing this variable is presented in table A.7 As is seen in table A.7 the belief estimate for the non missing belief variable is very close to the estimates reported in the main analysis. Table A.1 shows the observations dropped at each stage of sample selection process.

A.2 Supplementary Tables Chapter 1

Table A.1: Observations Lost at Each Stage of Sample Selection

Criteria	(1) Observations Lost	(2) Observations Remaining
Total NLSY97		8984
Drop if missing demographics, geography	346	8638
Drop missing parent outcomes, household net worth	2750	5888
Drop missing outcomes	952	4936
Drop missing beliefs except military/college	202	4734
Drop missing peer measures	119	4615
Drop missing ASVAB AFQT and risky behavior	93	4522

A.2.1 Oaxaca Blinder Output: Beliefs

Table A.2: Oaxaca Blinder: Belief Enroll College

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Avg Years of Parents Schooling		5.3400***	5.8772		3.2661***	6.0701
		(0.8968)	(8.9540)		(0.5360)	(8.9576)
HH Net Worth ($10,000s)		0.7772	0.0047		0.3636	-0.3678
		(1.1997)	(0.6301)		(0.9082)	(2.5852)
Parent Ever in Jail		0.5193**	0.0573		0.0288	-0.0953
		(0.2367)	(0.2266)		(0.1057)	(0.2198)
Parent Serve in Military		0.0295	0.0795		-0.0037	0.6406
		(0.1020)	(0.6741)		(0.0227)	(0.6898)
Mom's Age at First Birth		0.4708	-6.6317		0.9160**	-16.4253***
		(0.5573)	(6.2373)		(0.3915)	(6.1787)
% Peers Coll Plan (∼ 25 ppts)		2.3055***	-9.6571**		1.1388***	-6.0071
		(0.3734)	(4.6335)		(0.2526)	(4.9262)
% Peers Cut Class (∼ 25 ppts)		0.2024	-0.4450		0.1420	-0.2409
		(0.2395)	(2.4149)		(0.1435)	(2.4870)
% Peers Sports/Clubs (∼ 25 ppts)		0.0663	10.6139**		0.1809*	4.8678
		(0.1182)	(4.5549)		(0.0963)	(4.6953)
% Peers in Gang (∼ 25 ppts)		-0.0512	-3.7144		0.0859	-3.2115
		(0.4316)	(2.5741)		(0.2530)	(2.6936)
ASVAB AFQT (10 percentile pts)		8.7380***	-5.2775*		4.9289***	-3.0551
		(0.8783)	(2.7254)		(0.5591)	(2.8666)
Ever Stole $50+ by age 18		0.1336	-0.4792		0.1575	0.2278
		(0.0951)	(0.4721)		(0.1014)	(0.4807)
Ever Attack Someone by age 18		0.4358*	0.9365		0.5152**	1.5693**
		(0.2633)	(0.6619)		(0.2013)	(0.6524)
Ever had Sex by age 15		1.2613***	-0.1753		0.8664***	0.0421
		(0.3736)	(0.7812)		(0.2593)	(0.7347)
Female		-0.3721***	0.8530		0.0666	0.7724
		(0.1398)	(1.1920)		(0.1258)	(1.0980)
Hispanic		-2.7732***	-0.6269		-0.9603***	0.1477
		(0.4211)	(0.4986)		(0.2369)	(0.4211)
Black		-3.5527***	-1.1882**		-1.9167***	-0.5862
		(0.5920)	(0.5630)		(0.3757)	(0.4736)
Lived Rural Area 1997		0.0792	0.5303		-0.0024	1.2225
		(0.3959)	(1.6829)		(0.0418)	(2.0782)
Lived Urban Area 1997		-0.4888	1.5248		-0.0676	3.4358
		(0.3583)	(4.4446)		(0.0947)	(4.6525)
Lived NE US 1997		0.0063	-0.4557		-0.0118	-0.0604
		(0.0193)	(0.5554)		(0.0381)	(0.5556)
Lived Western US 1997		-0.0116	-1.7449**		-0.1895*	-0.8027
		(0.0328)	(0.8069)		(0.1060)	(0.7195)
Lived Southern US 1997		-0.3431	-1.5941		-0.1213	-0.5701
		(0.2485)	(1.0758)		(0.1804)	(0.9877)
Year of Birth		0.0374	4,213.2215*		-0.0005	2,837.2919
		(0.0574)	(2,309.9813)		(0.0065)	(2,422.1206)
High Net Worth Avg	82.6298***			82.6298***		
	(0.8319)			(0.8342)		
Comparison Avg	63.3565***			71.2966***		
	(0.9090)			(0.9197)		
difference	19.2733***			11.3331***		
	(1.2322)			(1.2416)		
explained	13.4517***			9.5347***		
	(1.5957)			(1.1820)		
unexplained	5.8216***			1.7985		
	(1.8842)			(1.5016)		
Constant			-4,192.6749*			-2,821.0946
			(2,308.9083)			(2,420.9641)
Observations	2,760	2,760	2,760	2,501	2,501	2,501
N Comparison	1658	1658	1658	1399	1399	1399
N High Net Worth	1102	1102	1102	1102	1102	1102

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.3: Oaxaca Blinder: Belief Work 20+ hrs

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Avg Years of Parents Schooling		0.4205	-1.7649		0.4169	-4.0515
		(0.4380)	(4.0972)		(0.2555)	(4.0494)
HH Net Worth ($10,000s)		-1.2055*	0.2811		-0.6282	-1.8720
		(0.6812)	(0.2643)		(0.5348)	(1.2300)
Parent Ever in Jail		0.0612	0.0296		-0.0303	-0.0053
		(0.1312)	(0.1321)		(0.0450)	(0.1183)
Parent Serve in Military		0.0765*	0.1469		0.0018	0.6073**
		(0.0432)	(0.2999)		(0.0067)	(0.3013)
Mom's Age at First Birth		0.4294	0.3531		0.1882	2.8196
		(0.3047)	(3.7689)		(0.2280)	(3.8156)
% Peers Coll Plans (∼ 25 ppts)		0.2894	-1.2262		0.2997***	-4.0606*
		(0.1768)	(2.3295)		(0.1152)	(2.4633)
% Peers Cut Class (∼ 25 ppts)		-0.0135	-0.0086		-0.0670	-0.9920
		(0.1116)	(1.1196)		(0.0601)	(1.0833)
% Peers in Sports/Clubs (∼ 25 ppts)		-0.0735	1.8616		0.0683	-3.5322*
		(0.0629)	(2.1379)		(0.0433)	(2.1364)
% Peers in Gang (∼ 25 ppts)		0.3790	-0.4248		0.1183	-0.8030
		(0.2306)	(1.2768)		(0.1212)	(1.2778)
ASVAB AFQT (10 percentile pts)		2.9448***	-6.5698***		0.6515***	-1.4536
		(0.4544)	(1.3541)		(0.2505)	(1.3617)
Ever Stole $50+ by age 18		0.0470	-0.0291		0.0178	-0.1292
		(0.0509)	(0.2412)		(0.0249)	(0.2127)
Ever Attack/harm Someone by age 18		-0.1044	0.0025		-0.0915	-0.0459
		(0.1386)	(0.3096)		(0.0923)	(0.3000)
Ever had Sex by age 15		-0.3951**	-0.3054		-0.0884	0.1438
		(0.1953)	(0.3750)		(0.1197)	(0.3427)
Female		-0.0134	0.0723		-0.0005	0.2665
		(0.0353)	(0.5776)		(0.0051)	(0.5482)
Hispanic		0.0113	-0.0379		0.0084	-0.0553
		(0.1960)	(0.2469)		(0.1080)	(0.2101)
Black		0.1791	-0.0778		0.2275	0.1589
		(0.2999)	(0.2822)		(0.1702)	(0.2239)
Lived Rural Area 1997		-0.1332	-0.0876		-0.0124	0.1730
		(0.1355)	(0.5653)		(0.0278)	(0.8391)
Lived Urban Area 1997		0.1693	0.4380		0.0230	0.9134
		(0.1174)	(1.4682)		(0.0355)	(1.9030)
Lived NE US 1997		-0.0027	-0.2757		0.0210	-0.0049
		(0.0102)	(0.2955)		(0.0227)	(0.2514)
Lived Western US 1997		0.0033	-0.5928		-0.0692	0.3357
		(0.0104)	(0.4007)		(0.0430)	(0.3465)
Lived Southern US 1997		-0.0392	-0.8340		0.1670**	0.1780
		(0.1237)	(0.5340)		(0.0824)	(0.4433)
Year of Birth		0.0121	-152.3476		-0.0012	-580.9247
		(0.0304)	(851.9050)		(0.0055)	(807.7502)
High Net Worth Avg	95.7703***			95.7703***		
	(0.3367)			(0.3366)		
Comparison Avg	92.0691***			93.9135***		
	(0.4371)			(0.4095)		
difference	3.7013***			1.8569***		
	(0.5517)			(0.5300)		
explained	3.0422***			1.2208**		
	(0.7233)			(0.5340)		
unexplained	0.6591			0.6360		
	(0.7826)			(0.6584)		
Constant			162.0564			592.9703
			(851.2093)			(807.3159)
Observations	3,138	3,138	3,138	2,790	2,790	2,790
N Comparison	1897	1897	1897	1549	1549	1549
N High Net Worth	1241	1241	1241	1241	1241	1241

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.4: Oaxaca Blinder: Belief Likelihood Military

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Avg Years of Parents Schooling		0.0452	0.1199		0.0294	0.1069
		(0.0357)	(0.3808)		(0.0228)	(0.3955)
HH Net Worth ($10,000s)		0.0606	0.0367*		0.0617	-0.0664
		(0.0528)	(0.0221)		(0.0397)	(0.1007)
Parent Ever in Jail		0.0045	0.0061		0.0016	0.0051
		(0.0092)	(0.0101)		(0.0043)	(0.0095)
Parent Serve in Military		-0.0114**	-0.0079		-0.0002	-0.0481
		(0.0047)	(0.0285)		(0.0024)	(0.0302)
Mom's Age at First Birth		0.0478**	-0.1881		0.0411**	-0.2712
		(0.0227)	(0.2718)		(0.0178)	(0.2833)
% Peers Coll Plan (∼ 25 ppts)		-0.0024	-0.0068		-0.0007	-0.0316
		(0.0130)	(0.1913)		(0.0084)	(0.2014)
% Peers Cut Class (∼ 25 ppts)		0.0032	-0.0440		0.0030	-0.0328
		(0.0098)	(0.1062)		(0.0058)	(0.1046)
% Peers Sports/Clubs (∼ 25 ppts)		-0.0046	-0.1922		-0.0037	-0.1827
		(0.0050)	(0.1926)		(0.0038)	(0.2063)
% Peers in Gang (∼ 25 ppts)		0.0109	-0.0356		0.0158	0.0218
		(0.0163)	(0.1032)		(0.0103)	(0.1065)
ASVAB AFQT (10 percentile pts)		0.1456***	-0.2624**		0.0374*	-0.0303
		(0.0356)	(0.1129)		(0.0212)	(0.1218)
Ever Stole $50+ by age 18		0.0020	-0.0258		0.0009	-0.0274
		(0.0029)	(0.0199)		(0.0015)	(0.0191)
Ever Attack/harm Someone by age 18		0.0387***	0.0207		0.0202**	0.0010
		(0.0117)	(0.0307)		(0.0084)	(0.0297)
Ever had Sex by age 15		0.0058	-0.0556		0.0200*	-0.0136
		(0.0156)	(0.0346)		(0.0108)	(0.0320)
Female		-0.0304***	0.0607		0.0032	0.1182**
		(0.0103)	(0.0514)		(0.0089)	(0.0480)
Hispanic		0.0043	0.0003		0.0005	-0.0063
		(0.0169)	(0.0236)		(0.0103)	(0.0200)
Black		-0.0466**	0.0170		-0.0185	0.0272
		(0.0232)	(0.0252)		(0.0150)	(0.0209)
Lived Rural Area 1997		-0.0127	0.0514		-0.0011	0.0618
		(0.0149)	(0.0658)		(0.0024)	(0.0813)
Lived Urban Area 1997		0.0093	0.1275		0.0014	0.1470
		(0.0132)	(0.1758)		(0.0032)	(0.1840)
Lived NE US 1997		0.0006	-0.0412*		-0.0002	-0.0034
		(0.0019)	(0.0241)		(0.0008)	(0.0240)
Lived Western US 1997		-0.0002	-0.0371		-0.0054	0.0017
		(0.0007)	(0.0334)		(0.0038)	(0.0302)
Lived Southern US 1997		0.0068	-0.0887*		0.0142*	-0.0337
		(0.0099)	(0.0455)		(0.0077)	(0.0415)
Year of Birth		0.0027	81.1232		-0.0001	15.2877
		(0.0024)	(73.9985)		(0.0006)	(74.6880)
Comparison Avg	2.3342***			2.1735***		
	(0.0341)			(0.0339)		
High Net Worth Avg	2.0343***			2.0343***		
	(0.0349)			(0.0349)		
difference	0.3000***			0.1392***		
	(0.0488)			(0.0487)		
explained	0.2796***			0.2207***		
	(0.0669)			(0.0474)		
unexplained	0.0204			-0.0815		
	(0.0816)			(0.0658)		
Constant			-80.5578			-15.1128
			(73.9949)			(74.6707)
Observations	2,637	2,637	2,637	2,504	2,504	2,504
N High Net Worth	1138	1138	1138	1138	1138	1138
N Comparison	1499	1499	1499	1366	1366	1366

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.5: Oaxaca Blinder: Belief Arrest

Comparison Group	Low Net Worth	Low Net Worth	Low Net Worth	Mid Net Worth	Mid Net Worth	Mid Net Worth
VARIABLES	overall	explained	unexplained	overall	explained	unexplained
Avg Years of Parents Schooling		-0.5315	2.4624		-0.3044	2.3912
		(0.4938)	(4.9736)		(0.2640)	(4.6804)
HH Net Worth ($10,000s)		-0.8613	-0.6117*		-0.9194*	-0.3471
		(0.7470)	(0.3665)		(0.5444)	(1.2859)
Parent Ever in Jail		0.2582*	0.2284**		-0.0153	0.1369
		(0.1394)	(0.1000)		(0.0498)	(0.0946)
Parent Serve in Military		0.0027	-0.0905		-0.0095	0.3001
		(0.0457)	(0.3589)		(0.0166)	(0.3703)
Mom's Age at First Birth		-0.0877	3.7529		0.4585**	-3.1649
		(0.3070)	(3.5127)		(0.1958)	(3.2039)
% Peers Coll Plan (~ 25 ppts)		0.1865	-3.7034		-0.0376	-1.0570
		(0.1742)	(2.5494)		(0.1074)	(2.5939)
% Peers Cut Class (~ 25 ppts)		0.4272***	0.0360		0.1814**	-0.9645
		(0.1304)	(1.2939)		(0.0741)	(1.2530)
% Peers Clubs/Sports (~ 25 ppts)		0.0027	1.0917		0.0584	-1.5624
		(0.0619)	(2.3531)		(0.0446)	(2.4182)
% Peers in Gang (~ 25 ppts)		0.6632***	1.9819		0.0458	0.4725
		(0.2370)	(1.2784)		(0.1271)	(1.2984)
ASVAB AFQT (10 percentile points)		0.6786	-0.5682		0.1107	1.1603
		(0.4463)	(1.4236)		(0.2596)	(1.4987)
Ever Stole $50+ by age 18		0.3424***	0.0197		0.1676*	-0.1691
		(0.1083)	(0.3190)		(0.0877)	(0.3069)
Ever Attack/harm Someone by age 18		0.7878***	0.6758*		0.3317***	0.1708
		(0.1673)	(0.3857)		(0.1102)	(0.3670)
Ever had Sex by age 15		0.8373***	-0.0935		0.6709***	0.2281
		(0.2051)	(0.4390)		(0.1482)	(0.4158)
Female		-0.3262***	-2.1361***		0.0384	-1.3693**
		(0.1051)	(0.6407)		(0.0850)	(0.5763)
Hispanic		0.1278	-0.3131		0.0659	-0.3270
		(0.2081)	(0.2879)		(0.1198)	(0.2510)
Black		0.1168	-0.5279		0.2393	-0.4107
		(0.2993)	(0.3467)		(0.1936)	(0.3028)
Lived Rural Area 1997		0.0382	-0.1570		0.0212	-1.4742
		(0.1695)	(0.7253)		(0.0452)	(1.0239)
Lived Urban Area 1997		-0.0145	-1.4163		-0.0098	-2.4986
		(0.1476)	(1.9373)		(0.0281)	(2.3887)
Lived NE US 1997		0.0022	-0.2880		-0.0097	-0.3572
		(0.0086)	(0.3136)		(0.0162)	(0.2967)
Lived Western US 1997		-0.0007	0.5613		0.0236	0.3278
		(0.0055)	(0.4177)		(0.0387)	(0.3732)
Lived Southern US 1997		-0.1029	0.1222		-0.1257	-0.1337
		(0.1244)	(0.5597)		(0.0920)	(0.5187)
Year of Birth		-0.0304	170.1484		-0.0065	-244.9536
		(0.0324)	(877.1799)		(0.0160)	(833.1692)
Comparison Avg	11.0901***			9.1181***		
	(0.4638)			(0.4337)		
High Net Worth Avg	7.1048***			7.1048***		
	(0.4078)			(0.4075)		
difference	3.9854***			2.0134***		
	(0.6177)			(0.5951)		
explained	2.5165***			0.9755		
	(0.8890)			(0.6149)		
unexplained	1.4689			1.0379		
	(1.0324)			(0.8117)		
Constant			-169.7059			254.6395
			(877.3648)			(833.5148)
Observations	3,138	3,138	3,138	2,790	2,790	2,790
N High Net Worth	1241	1241	1241	1241	1241	1241
N Comparison Group	1897	1897	1897	1549	1549	1549

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.6: Oaxaca Blinder: Belief Victim Violence

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Avg Years of Parents Schooling		0.0715	2.8695		0.1548	1.5672
		(0.5727)	(5.9273)		(0.3436)	(5.9960)
HH Net Worth ($10,000s)		0.0922	-0.1859		0.2744	-0.1398
		(0.7722)	(0.3738)		(0.5774)	(1.4614)
Parent Ever in Jail		0.1951	-0.0422		0.0252	-0.1090
		(0.1468)	(0.1284)		(0.0529)	(0.1201)
Parent Serve in Military		-0.0000	0.0974		-0.0022	0.1169
		(0.0515)	(0.4130)		(0.0089)	(0.4215)
Mom's Age at First Birth		0.4517	2.4572		0.0914	6.7371*
		(0.3286)	(3.7862)		(0.2324)	(3.8051)
% Peers Coll Plan (~ 25 ppts)		0.1760	-3.1626		-0.1352	1.4871
		(0.1906)	(2.8077)		(0.1260)	(2.9668)
% Peers Cut Class (~ 25 ppts)		0.5165***	-0.4881		0.2134**	-1.5728
		(0.1536)	(1.5658)		(0.0889)	(1.5304)
% Peers in Clubs/Sports (~ 25 ppts)		0.0763	0.3094		0.1510**	-4.6038*
		(0.0733)	(2.7326)		(0.0634)	(2.7382)
% Peers in Gang (~ 25 ppts)		0.5816**	-1.7003		0.2065	-2.3362
		(0.2670)	(1.6741)		(0.1487)	(1.6833)
ASVAB AFQT (10 percentile pts)		-2.5899***	2.6303		-1.3878***	1.8712
		(0.5235)	(1.6504)		(0.3050)	(1.7107)
Ever Stole $50+ by age 18		0.2089**	0.0748		0.0986*	-0.0815
		(0.0813)	(0.3092)		(0.0575)	(0.2953)
Ever Attack/harm Someone by age 18		0.7696***	-0.1363		0.4825***	-0.1704
		(0.1888)	(0.4463)		(0.1321)	(0.4241)
Ever had Sex by age 15		0.6986***	0.0961		0.3282**	-0.0664
		(0.2323)	(0.4911)		(0.1515)	(0.4574)
Female		-0.0765	-2.9841***		-0.0098	-0.9076
		(0.0497)	(0.7356)		(0.0223)	(0.6666)
Hispanic		0.0162	-0.0938		-0.0137	-0.2418
		(0.2400)	(0.3466)		(0.1404)	(0.2968)
Black		0.1422	0.2203		-0.0827	0.0135
		(0.3415)	(0.3628)		(0.2125)	(0.3135)
Lived Rural Area 1997		0.4469**	-0.2416		0.0034	1.6004
		(0.2247)	(0.9698)		(0.0171)	(1.0504)
Lived Urban Area 1997		-0.2648	-2.1161		0.0251	3.2483
		(0.1933)	(2.5861)		(0.0407)	(2.4200)
Lived NE US 1997		0.0004	0.0051		-0.0141	-0.2670
		(0.0044)	(0.3422)		(0.0197)	(0.3238)
Lived Western US 1997		-0.0100	-0.0272		-0.0780	0.0701
		(0.0279)	(0.4781)		(0.0536)	(0.4377)
Lived Southern US 1997		0.0767	0.0466		0.0043	-0.0580
		(0.1426)	(0.6415)		(0.1047)	(0.6039)
Year of Birth		-0.1129**	-2,085.7601*		-0.0136	-1,466.3832
		(0.0572)	(1,074.8159)		(0.0328)	(1,022.4104)
Comparison Avg	14.8882***			12.7611***		
	(0.5145)			(0.4839)		
High Net Worth Avg	11.3433***			11.3433***		
	(0.4759)			(0.4761)		
difference	3.5450***			1.4179**		
	(0.7008)			(0.6788)		
explained	1.4664			0.3217		
	(0.9760)			(0.6680)		
unexplained	2.0786*			1.0962		
	(1.2069)			(0.9514)		
Constant			2,090.2103*			1,461.3218
			(1,074.6616)			(1,022.7639)
Observations	3,138	3,138	3,138	2,790	2,790	2,790
N High Net Worth	1241	1241	1241	1241	1241	1241
N Comparison	1897	1897	1897	1549	1549	1549

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.7: Oaxaca Blinder: Belief Pregnancy

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Avg Years of Parents Schooling		0.8241*	2.9458		-0.1241	12.0696***
		(0.4595)	(4.4411)		(0.2546)	(4.2667)
HH Net Worth ($10,000s)		-0.4351	-0.1484		-0.2320	-0.3371
		(0.5002)	(0.2378)		(0.3823)	(1.1069)
Parent Ever in Jail		0.1467	0.1088		0.0413	0.1368
		(0.1314)	(0.0893)		(0.0577)	(0.0987)
Parent Serve in Military		0.0304	0.1479		0.0012	0.2970
		(0.0411)	(0.3183)		(0.0064)	(0.3017)
Mom's Age at First Birth		0.1885	-2.1540		0.2777*	-4.1393
		(0.2832)	(3.0227)		(0.1609)	(2.5914)
% Peers Coll Plans (∼ 25 ppts)		-0.0197	0.0362		0.0899	-1.9603
		(0.1628)	(2.1397)		(0.1038)	(2.2670)
% Peers Cut Class (∼ 25 ppts)		0.3132**	-1.6323		0.1004	-2.8149**
		(0.1326)	(1.2559)		(0.0624)	(1.1270)
% Peers in Clubs/Sports (∼ 25 ppts)		0.1100	-2.8480		0.0097	-0.1413
		(0.0691)	(2.1745)		(0.0386)	(2.1094)
% Peers in Gang (∼ 25 ppts)		0.7141***	1.4101		0.1714	0.3510
		(0.2556)	(1.3225)		(0.1363)	(1.3413)
ASVAB AFQT (10 percentile pts)		1.0176***	-2.7238**		0.4397*	-1.9840
		(0.3948)	(1.1970)		(0.2370)	(1.2925)
Ever Stole $50+ by age 18		0.2148***	0.4263		0.0417	-0.1515
		(0.0792)	(0.2664)		(0.0330)	(0.2375)
Ever Attack/harm Someone by age 18		0.3607**	0.4827		0.2714***	0.5130
		(0.1582)	(0.3556)		(0.1025)	(0.3305)
Ever had Sex by age 15		1.5087***	0.3076		0.9983***	0.3310
		(0.2146)	(0.4064)		(0.1592)	(0.3823)
Female		-0.1128**	-0.1557		0.0149	-0.0624
		(0.0495)	(0.5670)		(0.0331)	(0.4961)
Hispanic		0.4109**	-0.1052		0.2422**	-0.2088
		(0.1976)	(0.2651)		(0.1232)	(0.2365)
Black		0.8444***	-0.4525		0.1399	-0.6926**
		(0.2974)	(0.3306)		(0.1810)	(0.2922)
Lived Rural Area 1997		-0.1862	1.2967**		-0.0125	1.6120***
		(0.1464)	(0.6105)		(0.0268)	(0.5990)
Lived Urban Area 1997		0.1255	2.8910*		0.0251	4.1404***
		(0.1213)	(1.5654)		(0.0355)	(1.3805)
Lived NE US 1997		0.0030	-0.3021		-0.0081	-0.2465
		(0.0110)	(0.2879)		(0.0132)	(0.2355)
Lived Western US 1997		0.0072	-0.5573		-0.0313	0.3186
		(0.0203)	(0.3829)		(0.0369)	(0.3465)
Lived Southern US 1997		-0.0518	-0.0478		-0.0849	-0.0355
		(0.1191)	(0.5170)		(0.0807)	(0.4431)
Year of Birth		-0.0768*	-1,326.2211*		-0.0130	-1,233.2455*
		(0.0415)	(788.9277)		(0.0310)	(716.4666)
Comparison Avg	9.0643***			6.6869***		
	(0.4601)			(0.4139)		
High Net Worth Avg	3.7728***			3.7728***		
	(0.3125)			(0.3130)		
difference	5.2915***			2.9141***		
	(0.5562)			(0.5189)		
explained	5.9375***			2.3589***		
	(0.7343)			(0.4927)		
unexplained	-0.6460			0.5552		
	(0.8267)			(0.6814)		
Constant			1,326.6491*			1,226.8054*
			(788.7308)			(716.3481)
Observations	3,138	3,138	3,138	2,790	2,790	2,790
N High Net Worth	1241	1241	1241	1241	1241	1241
N Comparison	1897	1897	1897	1549	1549	1549

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.3 Supplementary Figures Chapter 2

Table A.8: Robustness Check: College Belief Missing Included Controls

VARIABLES	(1) Col_Grad_30	(2) Work Avg 20 hours in 2010	(3) Ever Served in Armed Forces	(4) Been Arrested	(5) Been Incarcerated	(6) Had Children by age 20
Belief: Prob Enroll Coll	0.0179***	0.0060*	0.0011	-0.0097***	-0.0046**	-0.0068**
	(0.0022)	(0.0032)	(0.0016)	(0.0029)	(0.0020)	(0.0027)
Belief: Prob Work 20+ Hrs	-0.0002	0.0174***	0.0004	-0.0006	0.0036	-0.0042
	(0.0028)	(0.0043)	(0.0020)	(0.0038)	(0.0026)	(0.0038)
Belief: Prob Arrest NY	-0.0009	-0.0071	-0.0040*	0.0200***	0.0128***	-0.0014
	(0.0030)	(0.0045)	(0.0022)	(0.0042)	(0.0037)	(0.0040)
Belief: Prob Victim Violence	-0.0059**	0.0035	-0.0004	-0.0016	-0.0015	-0.0033
	(0.0029)	(0.0038)	(0.0020)	(0.0035)	(0.0027)	(0.0032)
Belief: Prob Parent Young	0.0044	0.0084*	-0.0019	0.0108***	0.0062*	0.0141***
	(0.0028)	(0.0043)	(0.0024)	(0.0040)	(0.0035)	(0.0042)
Belief: Likelihood Join Military, Unlikely			0.0039			
			(0.0091)			
Belief: Likelihood Join Military, Undecided			0.0298***			
			(0.0097)			
Belief: Likelihood Join Military, Likely			0.0591***			
			(0.0176)			
Belief: Likelihood Join Military, Very Likely			0.1021***			
			(0.0218)			
Missing College Belief	0.1852***	0.0423	-0.0481***	0.0564*	0.0299	0.0039
	(0.0224)	(0.0365)	(0.0168)	(0.0341)	(0.0254)	(0.0321)
Belief Type 1: Prob Deg 30	-0.0519	0.0300	0.0443	0.0220	-0.0470	0.0087
	(0.0334)	(0.0537)	(0.0342)	(0.0524)	(0.0310)	(0.0452)
Belief Type 3: Prob Sch 5Y	0.0472**	0.0030	-0.0033	-0.0150	-0.0026	-0.0614*
	(0.0238)	(0.0411)	(0.0206)	(0.0373)	(0.0275)	(0.0341)
Belief Type 1#c.Prob College	0.0072*	-0.0035	-0.0049	0.0015	0.0070**	-0.0046
	(0.0042)	(0.0059)	(0.0037)	(0.0056)	(0.0032)	(0.0048)
Belief Type 3#c.Prob College	-0.0033	0.0031	0.0011	0.0025	0.0009	0.0043
	(0.0034)	(0.0049)	(0.0026)	(0.0044)	(0.0032)	(0.0040)
Observations	4,702	4,702	4,018	4,702	4,702	4,702
R-squared	0.3613	0.0763	0.0664	0.2538	0.1358	0.1979

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.3.1 Oaxaca Blinder Output: Outcomes and Beliefs

Table A.9: Oaxaca Blinder: Degree by age 30

VARIABLES	(1) overall	(2) explained	(3) unexplained	(4) overall	(5) explained	(6) unexplained
Belief: Prob Enroll Coll		0.0350***	0.1698***		0.0295***	0.0949**
		(0.0045)	(0.0402)		(0.0042)	(0.0430)
Belief: Prob Work 20+ Hrs		-0.0004	-0.0084		-0.0002	0.0058
		(0.0012)	(0.1110)		(0.0009)	(0.1225)
Belief: Prob Arrest NY		0.0006	0.0119		-0.0007	0.0057
		(0.0017)	(0.0092)		(0.0011)	(0.0096)
Belief: Prob Victim Violence		0.0031**	-0.0198*		0.0009	-0.0225*
		(0.0016)	(0.0118)		(0.0008)	(0.0123)
Belief: Prob Parent Young		-0.0046**	0.0036		-0.0001	0.0073
		(0.0019)	(0.0058)		(0.0013)	(0.0060)
Avg Yrs Parents School		0.0810***	0.4412***		0.0604***	0.2848*
		(0.0116)	(0.1333)		(0.0085)	(0.1463)
Parent Ever in Jail		-0.0014	0.0067**		-0.0000	0.0061**
		(0.0022)	(0.0032)		(0.0011)	(0.0030)
Parent Serve in Military		-0.0024*	-0.0097		-0.0010	0.0047
		(0.0014)	(0.0090)		(0.0010)	(0.0103)
Mom's Age at First Birth		0.0251***	0.0312		0.0090	0.1367
		(0.0069)	(0.0868)		(0.0057)	(0.0943)
% Peers Coll Plan (∼ 25 ppts)		-0.0020	-0.0324		0.0029	-0.1149*
		(0.0036)	(0.0609)		(0.0027)	(0.0673)
% Peers Cut Class (∼ 25 ppts)		0.0015	-0.0711**		0.0017	-0.0466
		(0.0028)	(0.0346)		(0.0019)	(0.0364)
% Peers Sports/Clubs (∼ 25 ppts)		0.0018	0.0090		0.0012	-0.0117
		(0.0013)	(0.0616)		(0.0011)	(0.0672)
% Peers in Gang (∼ 25 ppts)		0.0027	-0.0144		0.0043	-0.0068
		(0.0038)	(0.0302)		(0.0026)	(0.0316)
ASVAB AFQT (10 pct)		0.1468***	0.0279		0.1021***	-0.0303
		(0.0118)	(0.0369)		(0.0090)	(0.0419)
Ever Stole $50+ by age 18		0.0016	-0.0018		0.0009	0.0002
		(0.0010)	(0.0060)		(0.0007)	(0.0061)
Ever Attack Someone by age 18		0.0096***	-0.0049		0.0089***	0.0016
		(0.0029)	(0.0092)		(0.0027)	(0.0095)
Ever had Sex by age 15		0.0170***	-0.0330***		0.0180***	-0.0148
		(0.0043)	(0.0112)		(0.0037)	(0.0111)
Female		-0.0033**	0.0151		0.0007	0.0076
		(0.0014)	(0.0158)		(0.0013)	(0.0163)
Hispanic		-0.0110**	-0.0052		-0.0078**	-0.0100
		(0.0048)	(0.0080)		(0.0033)	(0.0073)
Black		-0.0288***	0.0067		-0.0217***	0.0024
		(0.0066)	(0.0080)		(0.0051)	(0.0073)
HH Net Worth ($10,000s)		0.0548***	-0.0169*		0.0393***	-0.0310
		(0.0204)	(0.0093)		(0.0152)	(0.0336)
High Net Worth Avg	0.5617***			0.5617***		
	(0.0149)			(0.0150)		
Comparison Avg	0.1508***			0.2809***		
	(0.0088)			(0.0120)		
difference	0.4109***			0.2808***		
	(0.0173)			(0.0192)		
explained	0.3246***			0.2462***		
	(0.0238)			(0.0190)		
unexplained	0.0863***			0.0345		
	(0.0281)			(0.0235)		
Constant			26.8635			18.1537
			(31.3742)			(33.4972)
Observations	2,760	2,760	2,760	2,501	2,501	2,501
N Comparison	1658	1658	1658	1399	1399	1399
N High Net Worth	1102	1102	1102	1102	1102	1102

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.10: Oaxaca Blinder: Work 20+ hrs in 2010

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Belief: Prob Enroll Coll		0.0089	0.0500		0.0127***	-0.0202
		(0.0057)	(0.0483)		(0.0040)	(0.0519)
Belief: Prob Work 20+ Hrs		0.0057***	-0.2055*		0.0009	-0.0801
		(0.0021)	(0.1156)		(0.0010)	(0.1245)
Belief: Prob Arrest NY		0.0009	-0.0031		0.0016	0.0036
		(0.0024)	(0.0097)		(0.0015)	(0.0102)
Belief: Prob Victim Violence		-0.0010	0.0196		-0.0012	0.0070
		(0.0020)	(0.0127)		(0.0010)	(0.0128)
Belief: Prob Parent Young		-0.0065**	0.0010		-0.0013	0.0065
		(0.0028)	(0.0062)		(0.0018)	(0.0066)
Avg Yrs Parents School		0.0118	-0.0976		0.0028	-0.0395
		(0.0131)	(0.1396)		(0.0082)	(0.1461)
Parent Ever in Jail		0.0032	-0.0032		0.0018	-0.0022
		(0.0032)	(0.0032)		(0.0015)	(0.0030)
Parent Serve in Military		-0.0003	0.0034		-0.0004	0.0114
		(0.0015)	(0.0103)		(0.0005)	(0.0109)
Mom's Age at First Birth		0.0139*	-0.0269		0.0009	0.1218
		(0.0084)	(0.0981)		(0.0061)	(0.1007)
% Peers Coll Plan (∼ 25 ppts)		-0.0072	-0.0260		0.0042	-0.2080***
		(0.0047)	(0.0689)		(0.0030)	(0.0729)
% Peers Cut Class (∼ 25 ppts)		-0.0001	0.0301		-0.0021	0.0034
		(0.0035)	(0.0374)		(0.0021)	(0.0382)
% Peers Sports/Clubs (∼ 25 ppts)		0.0022	-0.1236*		0.0001	-0.0776
		(0.0017)	(0.0696)		(0.0011)	(0.0722)
% Peers in Gang (∼ 25 ppts)		0.0124**	-0.0371		0.0003	-0.0773**
		(0.0059)	(0.0381)		(0.0034)	(0.0392)
ASVAB AFQT (10 percentile points)		0.0391***	-0.0673		0.0290***	-0.0962**
		(0.0128)	(0.0413)		(0.0078)	(0.0433)
Ever Stole $50+ by age 18		-0.0002	-0.0085		0.0011	0.0013
		(0.0012)	(0.0068)		(0.0009)	(0.0070)
Ever Attack Someone by age 18		0.0083**	-0.0088		0.0048*	-0.0126
		(0.0039)	(0.0108)		(0.0029)	(0.0107)
Ever had Sex by age 15		0.0160***	0.0009		0.0107***	-0.0008
		(0.0054)	(0.0123)		(0.0039)	(0.0119)
Female		0.0048***	0.0406**		-0.0008	0.0311*
		(0.0019)	(0.0179)		(0.0014)	(0.0172)
Hispanic		-0.0152***	0.0006		-0.0051	0.0057
		(0.0059)	(0.0084)		(0.0034)	(0.0072)
Black		0.0187**	-0.0049		0.0013	-0.0144*
		(0.0086)	(0.0098)		(0.0055)	(0.0085)
HH Net Worth ($10,000s)		0.0071	0.0029		0.0106	-0.0375
		(0.0197)	(0.0100)		(0.0150)	(0.0376)
High Net Worth Avg	0.7849***			0.7849***		
	(0.0124)			(0.0124)		
Comparison Avg	0.6248***			0.7119***		
	(0.0119)			(0.0121)		
difference	0.1601***			0.0730***		
	(0.0172)			(0.0173)		
explained	0.1210***			0.0752***		
	(0.0241)			(0.0173)		
unexplained	0.0391			-0.0022		
	(0.0295)			(0.0239)		
Constant			0.0071			19.2404
			(36.2634)			(37.0821)
Observations	2,760	2,760	2,760	2,501	2,501	2,501
N Comparison	1658	1658	1658	1399	1399	1399
N High Net Worth	1102	1102	1102	1102	1102	1102

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.11: Oaxaca Blinder: Military

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Belief: Prob Enroll Coll		0.0016	-0.0076		-0.0003	0.0060
		(0.0027)	(0.0277)		(0.0020)	(0.0317)
Belief: Prob Work 20+ Hrs		0.0003	0.0364		0.0000	0.0486
		(0.0008)	(0.0471)		(0.0005)	(0.0657)
Belief: Prob Arrest NY		0.0020*	0.0020		-0.0001	-0.0021
		(0.0012)	(0.0054)		(0.0008)	(0.0060)
Belief: Prob Victim Violence		-0.0006	0.0056		0.0001	0.0112
		(0.0010)	(0.0080)		(0.0004)	(0.0084)
Belief: Prob Parent Young		0.0003	-0.0083**		0.0018	-0.0050
		(0.0015)	(0.0039)		(0.0012)	(0.0041)
Belief: Likelihood Join Military		-0.0060***	0.0495**		-0.0043**	0.0111
		(0.0017)	(0.0220)		(0.0018)	(0.0235)
Avg Yrs of Parents School		0.0047	-0.0761		-0.0036	0.0341
		(0.0071)	(0.0851)		(0.0050)	(0.0917)
Parent Ever in Jail		-0.0004	-0.0003		0.0004	0.0006
		(0.0016)	(0.0019)		(0.0008)	(0.0018)
Parent Serve in Military		0.0033***	0.0015		0.0006	-0.0064
		(0.0013)	(0.0067)		(0.0012)	(0.0080)
Mom's Age at First Birth		-0.0076*	-0.0212		-0.0029	-0.0443
		(0.0044)	(0.0561)		(0.0040)	(0.0644)
% Peers Coll Plan (∼ 25 ppts)		-0.0060**	0.0438		-0.0026	0.0121
		(0.0026)	(0.0437)		(0.0019)	(0.0487)
% Peers Cut Class (∼ 25 ppts)		-0.0010	0.0436*		-0.0007	0.0413
		(0.0019)	(0.0229)		(0.0014)	(0.0256)
% Peers Sports Clubs (∼ 25 ppts)		0.0007	-0.0189		0.0003	-0.0038
		(0.0009)	(0.0421)		(0.0008)	(0.0477)
% Peers in Gang (∼ 25 ppts)		-0.0001	-0.0387*		-0.0004	-0.0435*
		(0.0028)	(0.0211)		(0.0024)	(0.0236)
ASVAB AFQT (10 percentile pts)		0.0258***	-0.0419*		0.0149***	-0.0357
		(0.0072)	(0.0237)		(0.0047)	(0.0266)
Ever Stole $50+ by age 18		0.0001	-0.0070*		0.0006	-0.0003
		(0.0006)	(0.0042)		(0.0006)	(0.0042)
Ever Attack Someone by age 18		-0.0018	0.0130*		-0.0042**	0.0033
		(0.0022)	(0.0071)		(0.0020)	(0.0074)
Ever had Sex by age 15		-0.0003	-0.0022		-0.0029	-0.0073
		(0.0031)	(0.0079)		(0.0025)	(0.0079)
Female		0.0041**	-0.0041		-0.0008	-0.0047
		(0.0016)	(0.0110)		(0.0015)	(0.0111)
Hispanic		-0.0024	-0.0089*		-0.0002	-0.0067
		(0.0032)	(0.0048)		(0.0023)	(0.0045)
Black		-0.0059	-0.0036		0.0019	0.0033
		(0.0048)	(0.0059)		(0.0036)	(0.0051)
HH Net Worth ($10,000s)		-0.0204*	0.0033		-0.0118	-0.0471*
		(0.0114)	(0.0042)		(0.0091)	(0.0254)
High Net Worth Avg	0.0721***			0.0721***		
	(0.0082)			(0.0081)		
Comparison Avg	0.0486***			0.0863***		
	(0.0059)			(0.0079)		
difference	0.0236**			-0.0142		
	(0.0101)			(0.0114)		
explained	-0.0064			-0.0178*		
	(0.0134)			(0.0102)		
unexplained	0.0300*			0.0036		
	(0.0180)			(0.0156)		
Constant			4.5927			-12.0556
			(19.3034)			(21.0695)
Observations	2,330	2,330	2,330	2,252	2,252	2,252
N Comparison	1318	1318	1318	1240	1240	1240
N High Net Worth	1012	1012	1012	1012	1012	1012

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.12: Oaxaca Blinder: Arrest

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Belief: Prob Enroll Coll		0.0161***	-0.0065		0.0083**	0.0031
		(0.0053)	(0.0468)		(0.0037)	(0.0509)
Belief: Prob Work 20+ Hrs		-0.0004	-0.0058		0.0004	-0.0735
		(0.0016)	(0.1084)		(0.0010)	(0.1208)
Belief: Prob Arrest NY		0.0079***	-0.0083		0.0048**	-0.0047
		(0.0026)	(0.0102)		(0.0020)	(0.0104)
Belief: Prob Victim Violence		0.0016	-0.0027		-0.0004	-0.0160
		(0.0018)	(0.0118)		(0.0007)	(0.0120)
Belief: Prob Parent Young		0.0056**	-0.0120*		0.0040**	-0.0097
		(0.0027)	(0.0072)		(0.0020)	(0.0075)
Avg Yrs Parents School		0.0019	0.0573		0.0167**	-0.1459
		(0.0121)	(0.1306)		(0.0079)	(0.1387)
Parent Ever in Jail		0.0077**	-0.0055*		0.0022	-0.0058*
		(0.0030)	(0.0032)		(0.0015)	(0.0031)
Parent Serve in Military		-0.0009	0.0085		-0.0002	0.0083
		(0.0014)	(0.0095)		(0.0004)	(0.0103)
Mom's Age at First Birth		-0.0020	0.0610		0.0012	0.0299
		(0.0077)	(0.0903)		(0.0056)	(0.0925)
% Peers Coll Plan (∼ 25 ppts)		-0.0046	-0.0279		-0.0081***	0.0767
		(0.0043)	(0.0645)		(0.0030)	(0.0700)
% Peers Cut Class (∼ 25 ppts)		0.0040	-0.0267		0.0021	-0.0332
		(0.0033)	(0.0355)		(0.0020)	(0.0362)
% Peers Sports/Clubs (∼ 25 ppts)		0.0007	0.0031		0.0007	-0.0087
		(0.0015)	(0.0615)		(0.0011)	(0.0658)
% Peers in Gang (∼ 25 ppts)		-0.0042	0.0609*		0.0004	0.0799**
		(0.0054)	(0.0344)		(0.0032)	(0.0358)
ASVAB AFQT (10 pct)		0.0282**	-0.0480		0.0044	0.0109
		(0.0119)	(0.0395)		(0.0075)	(0.0434)
Ever Stole $50+ by age 18		0.0096***	-0.0062		0.0059*	0.0004
		(0.0030)	(0.0073)		(0.0034)	(0.0074)
Ever Attack Someone by age 18		0.0263***	-0.0147		0.0239***	-0.0003
		(0.0046)	(0.0114)		(0.0044)	(0.0114)
Ever had Sex by age 15		0.0373***	0.0092		0.0254***	0.0151
		(0.0058)	(0.0124)		(0.0046)	(0.0120)
Female		-0.0110***	-0.0307*		0.0015	0.0039
		(0.0037)	(0.0176)		(0.0028)	(0.0165)
Hispanic		-0.0087	-0.0057		-0.0042	-0.0073
		(0.0057)	(0.0089)		(0.0033)	(0.0077)
Black		-0.0192**	0.0028		-0.0071	0.0071
		(0.0077)	(0.0083)		(0.0052)	(0.0073)
HH Net Worth ($10,000s)		0.0084	-0.0090		0.0022	-0.0044
		(0.0212)	(0.0133)		(0.0149)	(0.0371)
Comparison Avg	0.3788***			0.3481***		
	(0.0119)			(0.0127)		
High Net Worth Avg	0.2577***			0.2577***		
	(0.0132)			(0.0132)		
difference	0.1211***			0.0904***		
	(0.0178)			(0.0183)		
explained	0.1020***			0.0873***		
	(0.0250)			(0.0185)		
unexplained	0.0190			0.0031		
	(0.0288)			(0.0230)		
Constant			83.5020**			64.6415*
			(34.2687)			(36.8982)
Observations	2,760	2,760	2,760	2,501	2,501	2,501
N High Net Worth	1102	1102	1102	1102	1102	1102
N Comparison	1658	1658	1658	1399	1399	1399

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.13: Oaxaca Blinder: Incarceration

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Belief: Prob Enroll Coll		0.0066*	-0.0082		0.0026	0.0034
		(0.0034)	(0.0284)		(0.0023)	(0.0314)
Belief: Prob Work 20+ Hrs		-0.0017	0.1337**		-0.0001	0.0769
		(0.0011)	(0.0655)		(0.0007)	(0.0780)
Belief: Prob Arrest NY		0.0031	-0.0075		0.0023*	-0.0032
		(0.0020)	(0.0085)		(0.0013)	(0.0088)
Belief: Prob Victim Violence		0.0002	0.0094		-0.0006	0.0009
		(0.0013)	(0.0077)		(0.0006)	(0.0076)
Belief: Prob Parent Young		0.0026	0.0105**		0.0019	0.0136***
		(0.0021)	(0.0042)		(0.0015)	(0.0046)
Avg Yrs Parent School		0.0017	0.1159		0.0146***	-0.0837
		(0.0076)	(0.0753)		(0.0049)	(0.0797)
Parent Ever in Jail		0.0076***	-0.0010		0.0022*	-0.0012
		(0.0025)	(0.0027)		(0.0012)	(0.0026)
Parent Serve in Military		-0.0005	-0.0049		-0.0001	-0.0072
		(0.0009)	(0.0059)		(0.0002)	(0.0059)
Mom's Age at First Birth		0.0030	-0.0655		-0.0033	0.0129
		(0.0047)	(0.0525)		(0.0034)	(0.0539)
% Peers Coll Plan (∼ 25 ppts)		-0.0020	-0.0261		-0.0012	-0.0238
		(0.0027)	(0.0366)		(0.0018)	(0.0413)
% Peers Cut Class (∼ 25 ppts)		-0.0003	-0.0254		-0.0007	-0.0359*
		(0.0020)	(0.0199)		(0.0012)	(0.0205)
% Peers Sports/Clubs (∼ 25 ppts)		-0.0007	0.0974***		-0.0004	0.1039**
		(0.0010)	(0.0377)		(0.0007)	(0.0413)
% Peers in Gang (∼ 25 ppts)		0.0003	0.0115		0.0010	0.0185
		(0.0039)	(0.0204)		(0.0021)	(0.0209)
ASVAB AFQT (10 pct)		0.0211***	-0.0486**		0.0080*	-0.0269
		(0.0071)	(0.0221)		(0.0043)	(0.0239)
Ever Stole $50+ by age 18		0.0049***	-0.0007		0.0029*	0.0027
		(0.0017)	(0.0055)		(0.0017)	(0.0057)
Ever Attack Someone by age 18		0.0076***	-0.0113		0.0072***	-0.0078
		(0.0026)	(0.0072)		(0.0021)	(0.0070)
Ever had Sex by age 15		0.0090***	0.0019		0.0074***	0.0072
		(0.0033)	(0.0073)		(0.0024)	(0.0070)
Female		-0.0044***	-0.0391***		0.0006	-0.0220**
		(0.0016)	(0.0101)		(0.0011)	(0.0090)
HISPANIC		-0.0072**	-0.0067		-0.0025	-0.0028
		(0.0036)	(0.0049)		(0.0019)	(0.0040)
BLACK		-0.0097*	-0.0096*		-0.0018	-0.0023
		(0.0051)	(0.0054)		(0.0033)	(0.0046)
HH Net Worth ($10,000s)		0.0029	-0.0116		-0.0063	0.0178
		(0.0139)	(0.0129)		(0.0076)	(0.0214)
Comparison Avg	0.1049***			0.0893***		
	(0.0075)			(0.0076)		
High Net Worth Avg	0.0463***			0.0463***		
	(0.0063)			(0.0063)		
difference	0.0587***			0.0431***		
	(0.0098)			(0.0099)		
explained	0.0473***			0.0358***		
	(0.0155)			(0.0095)		
unexplained	0.0114			0.0072		
	(0.0179)			(0.0125)		
Constant			31.7404*			19.0572
			(17.2141)			(19.9345)
Observations	2,760	2,760	2,760	2,501	2,501	2,501
N High Net Worth	1102	1102	1102	1102	1102	1102
N Comparison	1658	1658	1658	1399	1399	1399

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.14: Oaxaca Blinder: Pregnancy

Comparison Group VARIABLES	Low Net Worth overall	Low Net Worth explained	Low Net Worth unexplained	Mid Net Worth overall	Mid Net Worth explained	Mid Net Worth unexplained
Belief: Prob Enroll Coll		0.0137***	-0.0268		0.0084***	-0.0309
		(0.0049)	(0.0358)		(0.0030)	(0.0375)
Belief: Prob Work 20+ Hrs		0.0020	-0.0016		0.0006	0.0126
		(0.0017)	(0.0770)		(0.0008)	(0.0815)
Belief: Prob Arrest NY		-0.0006	0.0057		-0.0016	-0.0016
		(0.0021)	(0.0066)		(0.0012)	(0.0069)
Belief: Prob Victim Violence		-0.0008	-0.0060		0.0002	-0.0026
		(0.0017)	(0.0095)		(0.0006)	(0.0094)
Belief: Prob Parent Young		0.0035	0.0016		0.0046**	0.0092*
		(0.0027)	(0.0051)		(0.0019)	(0.0055)
Avg Yrs Parents School		0.0224**	-0.0912		0.0139**	-0.0848
		(0.0103)	(0.0969)		(0.0058)	(0.0958)
Parent Ever in Jail		0.0070**	0.0032		0.0005	0.0020
		(0.0030)	(0.0019)		(0.0012)	(0.0019)
Parent Serve in Military		0.0008	-0.0001		0.0005	-0.0102
		(0.0011)	(0.0070)		(0.0006)	(0.0068)
Mom's Age at First Birth		0.0232***	-0.1820***		0.0034	-0.0009
		(0.0064)	(0.0672)		(0.0042)	(0.0668)
% Peers Coll Plan (∼ 25 ppts)		0.0078**	-0.0298		0.0033	-0.0211
		(0.0037)	(0.0472)		(0.0022)	(0.0491)
% Peers Cut Class (∼ 25 ppts)		0.0028	0.0155		0.0008	0.0015
		(0.0028)	(0.0256)		(0.0015)	(0.0251)
% Peers Sports/Clubs (∼ 25 ppts)		0.0021	-0.0882**		-0.0014	0.0401
		(0.0014)	(0.0449)		(0.0009)	(0.0450)
% Peers in Gang (∼ 25 ppts)		0.0044	-0.0213		0.0017	-0.0242
		(0.0051)	(0.0260)		(0.0028)	(0.0272)
ASVAB AFQT (10 percentile pts)		0.0149	-0.0348		0.0140***	-0.0573**
		(0.0092)	(0.0278)		(0.0050)	(0.0271)
Ever Stole $50+ by age 18		-0.0002	-0.0008		0.0005	0.0043
		(0.0010)	(0.0051)		(0.0006)	(0.0051)
Ever Attack Someone by age 18		0.0053*	-0.0024		0.0045**	-0.0013
		(0.0031)	(0.0076)		(0.0022)	(0.0073)
Ever had Sex by age 15		0.0368***	0.0219**		0.0185***	0.0034
		(0.0051)	(0.0092)		(0.0036)	(0.0089)
Female		0.0095***	0.1072***		-0.0010	0.0551***
		(0.0032)	(0.0126)		(0.0019)	(0.0116)
HISPANIC		0.0013	-0.0040		0.0043*	0.0025
		(0.0045)	(0.0058)		(0.0024)	(0.0048)
BLACK		0.0078	-0.0057		0.0080*	0.0025
		(0.0069)	(0.0068)		(0.0044)	(0.0058)
HH Net Worth ($10,000s)		-0.0003	0.0133*		0.0074	-0.0180
		(0.0095)	(0.0069)		(0.0069)	(0.0276)
Comparison Avg	0.2527***			0.1658***		
	(0.0107)			(0.0099)		
High Net Worth Avg	0.0499***			0.0499***		
	(0.0066)			(0.0066)		
difference	0.2028***			0.1159***		
	(0.0125)			(0.0119)		
explained	0.1686***			0.0936***		
	(0.0155)			(0.0103)		
unexplained	0.0342*			0.0223		
	(0.0192)			(0.0145)		
Constant			-11.6451			19.1523
			(23.9931)			(24.4825)
Observations	2,760	2,760	2,760	2,501	2,501	2,501
N High Net Worth	1102	1102	1102	1102	1102	1102
N Comparison	1658	1658	1658	1399	1399	1399

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix B

Appendix to Chapter 3

B.1 Data Construction and Summary Statistics

From the NLSY97 I use data on parental education, household net worth, self reported probabilities of school enrollment and obtaining a degree by age 30[1], labor market earnings, schooling activities, financial assistance, and parental transfers. Additionally I use demographic information like race, ethnicity, gender, census region, urban/rural categorical variables, gender, as well as year of birth. Table 3.11 shows the resulting sample size after dropping missing variables.

I use measures of cognitive human capital and non-cognitive human capital in the empirical and quantitative analysis to control for early childhood human capital stock (Heckman and Kautz 2014). I use Armed Services Vocational Aptitude Battery (ASVAB) math and verbal scores as measures of cognitive human capital. I also control for non-cognitive human capital by using indicator variables for participation in adverse behavior such as theft, violence, and sexual intercourse before age 15 (Hai and Heckman 2017).

For the empirical analysis and the structural model estimation that follows, the sample is restricted to adolescents who are not missing household net worth, parental education information, earnings in later years, ASVAB test scores, self reported beliefs before age 18 and self reported adverse behavior. For grades I use transcript data in the NLSY97 for GPA, as opposed to the self reported data. For youth missing transcript data, I impute transcript GPA. I do this by regressing transcript GPA on self reported college GPA, demographic characteristics, and human capital measures. I then use the predicted transcript values from the portion of the sample that only includes self-reported GPA.

[1]For individuals that are missing Probability of Degree, I impute it using the quantitative model equivalent to probability of degree; probability of enrollment times probability of continuation; using consecutive year estimates of probability of enrollment.

Table B.1: Observations Lost at Each Stage of Sample Selection

Criteria	(1) Observations Lost	(2) Observations Remaining
Total NLSY97		8984
Drop missing parent education and HH net worth	2542	6442
Drop missing belief probability of degree/enroll and continuation	1450	4992
Drop missing educational attainment/college enrollment	1201	3791
Drop missing ASVAB math verbal scores	587	3204
Drop missing adverse behavior young age	676	2528
Drop missing race/ethnicity, year of birth, census region, urban/rural	91	2437
Drop missing high school peers with college plans	27	2410
Drop missing financial aid or GPA while enrolled	152	2258
Drop missing average lifetime earnings	125	2133

For parental education I take the average of mother's and father's years of schooling if both parents education level is in the data. If only one parent is in the data then I use that parent's years of schooling to measure parental education I bottom code at 8 years of schooling and top code at 16 years of schooling. For household net worth, I use the parent's reported household net worth at the start of the survey, before agents enroll in college. For individuals that do not have parental reports of net worth recorded, I impute household net worth using the individual youth's report.

I drop individuals that identify as Asian, Native American and races marked as other due to small sample sizes. For this reason I restrict the analysis to Hispanic, White, and Black youth. In total the sample size is 2,133 individuals. All statistics, regressions, and patterns in the empirical analysis are weighted using sampling weights created by the Bureau of Labor Statistics for the NLSY97[2].

Since youth born between 1983-1984 were not asked for probability of degree by age 30 while in high school, I used a variable College Outcome Belief that is equal to self reported probability of degree by age 30 for youth born before 1982 and self reported probability of enrollment in college for youth born after 1982. Combining these two variables was done to increase sample size while still capturing relative optimism and pessimism among youth. This variable is used in the outcomes regressions Table 3.1 and Table 3.3, as well as in the estimation of the quantitative model where beliefs about own ability are a function of this belief measure.

As shown in appendix A.7 additional tables. The College Outcome Belief effect is towards the center of the often higher effect of Probability of Degree belief and Probability of Enrollment. The difference in the coefficient of the College Outcome Belief variable compared to the other two belief variables is no more than 0.04 at a measure of 1, which will likely lead to little bias. Future specifications will control for any bias introduced through the construction of this variable by adding year of birth controls.

[2]The custom sampling weights for whether individuals are in all years of the sample is used

Table B.2: Summary Statistics by Race Ethnicity

VARIABLES	(1) All	(2) White	(3) Hispanic	(4) Black
Enrolled in College	0.717	0.740	0.626	0.670
Bachelors or More	0.301	0.336	0.171	0.222
Parent Edu Lt 12	0.220	0.158	0.541	0.288
Parent Edu 12	0.216	0.202	0.176	0.313
Parent Edu 13-15	0.388	0.434	0.200	0.302
Parent Edu 16+	0.176	0.205	0.083	0.098
Avg Parent Edu	13.02	13.43	11.15	12.37
HH Net Worth ($1000s)	185.8	226.4	80.68	56.04
Pct Peers ColPlan	66.5	68.7	60.8	68.5
Prob Enroll	0.751	0.758	0.734	0.732
Prob Degree	0.777	0.793	0.679	0.767
College GPA	2.65	2.79	2.41	2.14
Total Govt/Inst Aid ($1000s)	2.3	1.96	1.65	2.71
Total Fam Aid ($1000s)	1.64	1.92	0.96	0.60
ASVAB AFQT	54.73	61.20	40.32	32.15
Ever Stole	0.0671	0.0608	0.0943	0.0779
Ever Violence	0.161	0.141	0.165	0.265
Ever Sex before 15	0.182	0.145	0.186	0.375
Sample Size	2133	1188	404	541

Table B.3: Summary Statistics by Parent Education

VARIABLES	(1) All	(2) Lt 12	(3) 12	(4) 13-15	(5) 16 +
Enrolled in College	0.717	0.447	0.614	0.814	0.944
Bachelors or More	0.301	0.0787	0.208	0.359	0.544
Hispanic	0.116	0.285	0.092	0.062	0.056
Black	0.146	0.191	0.212	0.114	0.082
Avg Parent Edu	13.02	10.10	12.00	13.77	16.00
HH Net Worth ($1000s)	185.8	53.53	123.8	201.7	375.8
Pct Peers ColPlan	66.5	58.2	62.3	69.7	75.2
Prob Enroll	0.751	0.572	0.713	0.812	0.882
Prob Degree	0.777	0.633	0.691	0.840	0.917
College GPA	2.65	2.21	2.62	2.68	2.98
Total Govt/Inst Aid ($1000s)	2.3	2.40	1.68	1.93	2.29
Total Fam Aid ($1000s)	1.64	0.42	0.85	1.64	3.01
ASVAB AFQT	54.73	32.47	49.53	60.13	75.08
Ever Stole	0.0671	0.0928	0.0492	0.0750	0.0422
Ever Violence	0.161	0.233	0.176	0.147	0.0903
Ever_Sex before 15	0.182	0.295	0.210	0.152	0.0845
Sample Size	2133	586	493	736	318

B.2 Supplementary Analysis

Table B.4: Financial Assistance

VARIABLES	(1) Any Family Aid	(2) Total Fam Aid	(3) Any Govt/Coll Aid	(4) Total Govt/Coll Aid
Parent Edu	0.0346***	0.1854***	-0.0006	-0.0793
	(0.0072)	(0.0607)	(0.0078)	(0.0751)
HH Net Worth	0.0003***	0.0050***	-0.0002***	0.0001
	(0.0001)	(0.0009)	(0.0001)	(0.0007)
ASVAB AFQT	0.0030***	0.0114**	0.0022***	0.0216***
	(0.0006)	(0.0045)	(0.0006)	(0.0067)
Female	0.0322	-0.0604	0.0574**	0.2054
	(0.0249)	(0.2464)	(0.0276)	(0.3452)
Hispanic	0.0198	0.5455*	0.0995**	-0.5875
	(0.0403)	(0.3057)	(0.0441)	(0.5116)
Black	-0.0134	0.0212	0.1932***	0.9796**
	(0.0393)	(0.2425)	(0.0386)	(0.4450)
Geography Controls	Yes	Yes	Yes	Yes
Birth Year	Yes	Yes	Yes	Yes
Non Cognitive Controls	Yes	Yes	Yes	Yes
Robust Standard Errors	Yes	Yes	Yes	Yes
Peer Effects	Yes	Yes	Yes	Yes
Observations	1,467	929	1,467	940
R-squared	0.1478	0.2416	0.0503	0.0379

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.4: OLS results of financial assistance type by demographics and AFQT.

Table B.5: Oaxaca-Blinder Decomp: Subj Prob Degree: White vs Hispanic/Black

VARIABLES	White Hisp overall	White Hisp explained	White Hisp unexplained	White Black overall	White Black explained	White Black unexplained
Parent Edu		0.0604***	0.0822**		0.0317***	0.0582
		(0.0105)	(0.0326)		(0.0056)	(0.0473)
HH Net Worth (1000$s)		0.0139***	0.0092		0.0158***	-0.0032
		(0.0043)	(0.0084)		(0.0050)	(0.0079)
ASVAB AFQT		0.0537***	-0.0218		0.0682***	-0.0317
		(0.0083)	(0.0306)		(0.0094)	(0.0276)
Female		-0.0002	-0.0161		-0.0033**	0.0070
		(0.0014)	(0.0176)		(0.0016)	(0.0202)
% Peers College Plan		0.0128***	-0.0505		0.0127***	-0.0168
		(0.0036)	(0.0600)		(0.0035)	(0.0581)
Ever Stole more $50		0.0002	0.0007		0.0000	-0.0060
		(0.0005)	(0.0053)		(0.0002)	(0.0044)
Ever Violence		0.0014	-0.0090		0.0038*	-0.0106
		(0.0013)	(0.0086)		(0.0021)	(0.0088)
Ever Sex bf15		0.0051**	-0.0194*		0.0191***	-0.0113
		(0.0024)	(0.0103)		(0.0051)	(0.0123)
Ref Mean (White)	0.7659***			0.7659***		
	(0.0093)			(0.0093)		
Comp Mean	0.7053***			0.7375***		
	(0.0162)			(0.0154)		
difference	0.0606***			0.0285		
	(0.0187)			(0.0180)		
explained	0.1470***			0.1477***		
	(0.0124)			(0.0115)		
unexplained	-0.0864***			-0.1192***		
	(0.0208)			(0.0194)		
Constant			34.6180			5.9500
			(23.3366)			(21.4124)
Observations	1,592	1,592	1,592	1,716	1,716	1,716
N Comparison	404	404	404	528	528	528
N Reference (White)	1188	1188	1188	1188	1188	1188

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.5: Oaxaca Blinder decomposition of racial gap in college beliefs.

Table B.6: Oaxaca-Blinder Decomp: Enroll: White vs Hispanic/Black

VARIABLES	White Hisp overall	White Hisp explained	White Hisp unexplained	White Black overall	White Black explained	White Black unexplained
Parent Edu		0.0674***	0.0634		0.0333***	0.0559
		(0.0139)	(0.0448)		(0.0069)	(0.0588)
HH Net Worth ($1000s)		0.0152***	-0.0030		0.0163**	0.0021
		(0.0055)	(0.0133)		(0.0063)	(0.0134)
ASVAB AFQT		0.1317***	-0.0324		0.1740***	-0.1048***
		(0.0132)	(0.0427)		(0.0142)	(0.0354)
Belief Var		0.0198***	-0.0254		0.0081	0.0591
		(0.0065)	(0.0627)		(0.0052)	(0.0532)
Female		-0.0003	0.0191		-0.0085***	-0.0506**
		(0.0017)	(0.0244)		(0.0030)	(0.0242)
% Peers College Plan		0.0052	0.0246		-0.0005	0.1512**
		(0.0035)	(0.0820)		(0.0035)	(0.0699)
Ever Stole more $50		0.0002	-0.0033		-0.0000	-0.0052
		(0.0005)	(0.0071)		(0.0001)	(0.0050)
Ever Violence		0.0011	-0.0189		0.0055**	-0.0037
		(0.0012)	(0.0116)		(0.0028)	(0.0111)
Ever Sex bf15		0.0029	-0.0061		0.0106*	-0.0107
		(0.0021)	(0.0132)		(0.0055)	(0.0143)
Ref Mean (White)	0.7239***			0.7239***		
	(0.0130)			(0.0130)		
Comp Mean	0.5743***			0.6534***		
	(0.0246)			(0.0207)		
difference	0.1496***			0.0705***		
	(0.0278)			(0.0244)		
explained	0.2432***			0.2388***		
	(0.0190)			(0.0179)		
unexplained	-0.0936***			-0.1683***		
	(0.0269)			(0.0240)		
Constant			3.9612			19.0688
			(31.3443)			(25.9906)
Observations	1,592	1,592	1,592	1,716	1,716	1,716
N Comparison	404	404	404	528	528	528
N Reference (White)	1188	1188	1188	1188	1188	1188

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.6: Oaxaca Blinder decomposition of racial gap in college enrollment.

Table B.7: Oaxaca-Blinder Decomp: College Cont: White vs Hispanic/Black

VARIABLES	White Hisp overall	White Hisp explained	White Hisp unexplained	White Black overall	White Black explained	White Black unexplained
Parent Edu		0.0905***	0.1009		0.0514***	0.0910
		(0.0178)	(0.0655)		(0.0102)	(0.0828)
HH Net Worth (1000$s)		0.0167*	-0.0197		0.0189*	-0.0249**
		(0.0091)	(0.0255)		(0.0105)	(0.0122)
ASVAB AFQT		0.0675***	0.0653		0.1078***	-0.0541
		(0.0146)	(0.0695)		(0.0175)	(0.0612)
Belief Var		0.0139**	-0.0010		0.0082*	0.0484
		(0.0057)	(0.1128)		(0.0044)	(0.0809)
College Avg GPA		0.0602***	-0.0533		0.1141***	-0.0520
		(0.0118)	(0.0934)		(0.0132)	(0.0865)
Total Govt/Inst Aid		0.0013	0.0155		-0.0052*	0.0065
		(0.0013)	(0.0214)		(0.0029)	(0.0159)
Total Fam Aid		0.0086**	-0.0143		0.0115**	-0.0258**
		(0.0041)	(0.0152)		(0.0051)	(0.0115)
College Stud Loan		-0.0035	-0.0004		-0.0001	-0.0175
		(0.0022)	(0.0126)		(0.0009)	(0.0179)
Female		0.0002	0.0087		-0.0034	0.0261
		(0.0011)	(0.0330)		(0.0031)	(0.0351)
% Peers College Plan		0.0039	0.0725		0.0049	0.0541
		(0.0048)	(0.1214)		(0.0060)	(0.0924)
Ever Stole more $50		0.0003	0.0007		0.0015	0.0086
		(0.0013)	(0.0085)		(0.0016)	(0.0068)
Ever Violence		0.0008	-0.0019		0.0033	0.0064
		(0.0028)	(0.0140)		(0.0037)	(0.0111)
Ever Sex bf15		0.0090**	-0.0453***		0.0246***	-0.0397***
		(0.0045)	(0.0147)		(0.0080)	(0.0150)
Ref Mean (White)	0.5790***			0.5790***		
	(0.0168)			(0.0168)		
Comp Mean	0.3586***			0.4124***		
	(0.0312)			(0.0262)		
difference	0.2204***			0.1666***		
	(0.0354)			(0.0311)		
explained	0.2695***			0.3373***		
	(0.0250)			(0.0239)		
unexplained	-0.0491			-0.1708***		
	(0.0356)			(0.0322)		
Constant			31.0493			-21.1310
			(41.3287)			(34.1851)
Observations	1,104	1,104	1,104	1,221	1,221	1,221
N Comparison	237	237	237	354	354	354
N Reference (White)	867	867	867	867	867	867

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.7: Oaxaca Blinder decomposition of racial gap in college continuation.

Table B.8: Average Log Earnings

VARIABLES	(1) HS or Less	(2) Some Coll	(3) Bach Deg or More	(4) Returns SCol	(5) Returns Bach
Parent Edu	0.0133	-0.0010	-0.0271*	-0.0143	-0.0404
	(0.0196)	(0.0155)	(0.0136)	(0.0281)	(0.0268)
HH Net Worth	0.0010***	0.0002	0.0003**	-0.0008**	-0.0007**
	(0.0003)	(0.0002)	(0.0001)	(0.0003)	(0.0003)
Prob Deg	0.2397**	0.2016*	0.1355	-0.0380	-0.1042
	(0.1022)	(0.1058)	(0.1085)	(0.1561)	(0.1703)
ASVAB AFQT	0.0048**	0.0007	0.0059***	-0.0041*	0.0011
	(0.0018)	(0.0011)	(0.0013)	(0.0022)	(0.0024)
Female	-0.7265***	-0.4011***	-0.3544***	0.3254***	0.3722***
	(0.0751)	(0.0656)	(0.0558)	(0.0996)	(0.0935)
Hispanic	-0.0803	0.2513***	0.0649	0.3316***	0.1452
	(0.0954)	(0.0800)	(0.0938)	(0.1244)	(0.1338)
Black	-0.4046***	-0.2088**	0.1860*	0.1959	0.5907***
	(0.0995)	(0.0844)	(0.1019)	(0.1303)	(0.1424)
Constant	9.9542***	10.2503***	10.7313**	0.2961	0.7771*
	(0.2779)	(0.3658)	(0.2925)	(0.4697)	(0.4246)
Observations	666	696	771	2,133	2,133
R-squared	0.2594	0.1254	0.1258	0.2738	0.2738

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.8: OLS log average earnings and returns to schooling interacted with demographics and AFQT.

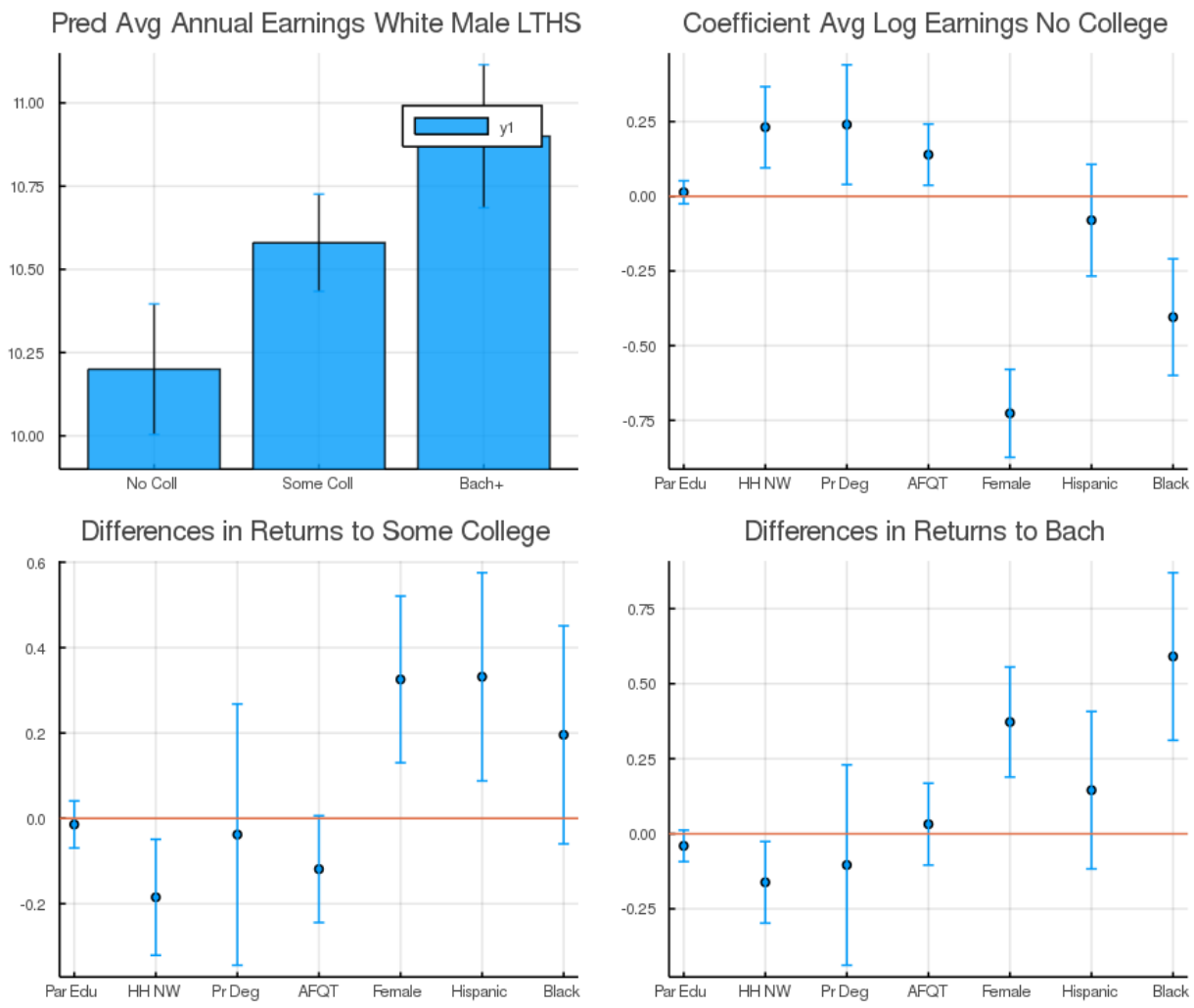

Figure B.1: Plot: Average earnings no college and returns to college by covariate.

B.3 Likelihood Function: Finite Mixture Model

In this section, I briefly go over the likelihood function used to estimate the finite mixture model. The finite mixture model, uses the four continuous ASVAB test scores (Arithmetic Reasoning, Mathematical Knowledge, Paragraph Comprehension, and Word Knowledge), the three discrete adverse behavior measures (Sex before age 15, ever committed violence at start of survey, and ever stole greater than $50 at start of the survey), discrete college GPA categories (0.0-2.0, 2.0-3.0, 3.0-4.0), and earnings as measurement equations.

These measurement equations are functions of the latent type τ for scorer type. The finite mixture model also controls for demographic selection in enrollment and college continuation. The probability that $\tau = \tau_h$ is also allowed to differ by demographic group.

Equation (a.1) shows the full likelihood function. The first line is the product of the likelihood contribution of all four of the cognitive ability measures, the ASVAB test scores, which are observed for the whole sample. In the likelihood function $\phi(\cdot)$ is the pdf for the standard normal distribution, where the first argument is normalized subtracting its mean and dividing the difference by the standard deviation.

The second line of (a.1) is the product of the likelihood contribution of observing the three discrete non cognitive ability measures. $\Phi(\cdot)$ is the CDF of the standard normal distribution where Z^*_{i,j_n} is normalized by subtracting its mean and dividing the difference by the standard deviation.

The third line of (a.1) is the probability that an individual has less than or equal to 12 years of schooling, multiplied by the pdf of observing log earnings $\ln w_{i,s}$, where log earnings are assumed to be normally distributed. The fourth and fifth lines are similar to line three of (a.1) in that we multiply the probability of observing schooling type, by the likelihood of earnings given schooling type. Lines three and four differ in that we also multiply by the likelihood of observing GPA $g = g_k$, since this information is only seen if agents enroll.

Notice type τ_k enters earnings for college graduates, grade probabilities, and cognitive ability measurements. Demographic information X_i enters probability of being high type, as well as probability of enrollment then non completion Prob($s \in (12, 16)$) and probability of having a bachelor's degree Prob($s \geq 16$).

$$
\begin{aligned}
(a.1) \qquad & f(\vec{Z}_i, w_i, g_i; \tau_k, X_i, s) = \Pi_{j_c} \phi(Z^*_{i,j_c}; \tau_k) \times \\
& \Pi_{j_n} \Phi(Z^*_{i,j_n}; \tau_k)^{1(Z^*_{i,j_n})} \times (1 - \Phi(Z^*_{i,j_n}; \tau_k))^{1-1(Z^*_{i,j_n})} \\
& \times [\text{Prob}(s \leq 12 | X_i)) \phi(\ln w_{i,s})]^{1(s<12)} \\
& \times [\text{Prob}(s \in (12,16) | X_i) \Pi_{g_k} \pi(g_k | \tau_k)^{1(g=g_k)} \phi(\ln w_{i,s})]^{1(s \in (12,16))} \\
& \times [\text{Prob}(s \geq 16) | X_i) \Pi_{g_k} \pi(g_k | \tau_k)^{1(g=g_k)} \phi(\ln w_{i,s}; \tau_k)]^{1(s \geq 16)}
\end{aligned}
$$

B.4 Finite Mixture Model Results

Table B9: Funding by Demographic: External Estimate

VARIABLES	OLS log Family Aid	OLS log Gov Coll Aid
Intercept	-0.963	3.67***
	(0.637)	(0.722)
Parent Edu	0.347***	0.0455
	(0.045)	(0.0513)
HH Net Worth ($1000s)	0.0032***	-0.0012***
	(0.0004)	(0.00046)
Black	-0.718***	1.093***
	(0.217)	(0.246)
Hispanic	-0.144	0.311
	(0.258)	(0.292)
Female	0.182	0.587
	(0.171)	(0.194)
Birth Yr 1981	0.329	0.0436
	(0.245)	(0.278)
Birth Yr 1983	0.114	-0.0238
	(0.247)	(0.280)
Birth Yr 1984	0.415*	0.161
	(0.245)	(0.277)
Observations	1,467	1,467
R-squared	0.1554	0.0345

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

Table B.9: OLS log average funding by type and demographics.

Table B.10: Prob by Demographic: FMM

VARIABLES	Logit Prob High Type	Logit Prob Enroll	Logit Prob Continue
Intercept	-1.029***	-0.991***	-3.367 ***
	(0.306)	(0.163)	(0.333)
Parent HS	0.930***	0.610***	0.460***
	(0.286)	(0.132)	(0.212)
Parent Some Coll	1.296***	1.407***	0.756***
	(0.341)	(0.151)	(0.204)
Parent Bach	2.635***	2.58***	1.159***
	(0.663)	(0.272)	(0.217)
HH Net Worth Tercile 2	0.358*	0.396***	0.337*
	(0.185)	(0.129)	(0.172)
HH Net Worth Tercile 3	1.044***	1.063***	0.637***
	(0.348)	(0.169)	(0.185)
Hispanic	-0.655***	0.307**	-0.040
	(0.201)	(0.145)	(0.189)
Black	-1.488***	0.441	0.354**
	(0.467)	(0.139)	(0.164)
Female	0.224	0.629***	0.043
	(0.249)	(0.105)	(0.119)
GPA Med			2.167***
			(0.240)
GPA High			1.475***
			(0.239)

Boot Strapped standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.10: Finite mixture model: probability of high type, enrollment/continuation selection control.

Table B.11: Cognitive and Non Cognitive Measurement: FMM

VARIABLES	Linear ASVAB Math Knowledge	Linear ASVAB Arithmetic Reasoning	Linear ASVAB Word Knowledge	Linear ASVAB Paragraph Comprehension
Intercept	-9.048***	-11.077***	-12.970***	-10.231***
	(1.176)	(1.097)	(1.104)	(1.149)
High Type	14.877***	13.710***	13.968***	14.449***
	(2.295)	(2.126)	(2.155)	(2.228)
Variance	6.988***	7.05***	6.479***	6.077***
	(0.503)	(0.428)	(0.470)	(0517)

	Probit Ever Sex bf 15	Probit Ever Violence	Probit Ever Stole gt 50
Intercept	-0.488***	-0.864***	-1.454***
	(0.204)	(0.142)	(0.115)
High Type	-0.646	-0.209	-0.128
	(0.400)	(0.260)	(0.206)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.11: Finite mixture model results: cognitive and non cognitive ability.

Table B.12: Grades and Earnings: FMM

VARIABLES	Logit Prob GPA (2.0-3.0)	Logit Prob GPA (3.0-4.0)
Intercept	0.767***	-0.315
	(0.110)	(0.225)
High Type	0.565***	1.939***
	(0.177)	(0.352)
	Linear Earnings	
Intercept	9.879***	
	(0.038)	
Ever Enrolled	0.423***	
	(0.043)	
Bachelors	0.124*	
	(0.067)	
Bachelor*High Type	0.256***	
	(0.075)	
Std Error Unobserved Shock	0.83***	
	(0.0223)	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.12: Finite mixture model results: earnings and GPA.

B.5 Indirect Inference: Targeted vs Simulated Moments

Table B.13: Indirect Inference OLS Targets

VARIABLES	(1) Enrolled Data	(2) Enrolled Sim	(3) Continue Data	(4) Continue Sim
Intercept	0.376	0.287	-0.068	-0.012
	(0.033)	(0.065)	(0.0502)	(0.032)
High Belief	0.215	0.201		
	(0.019)	(0.027)		
Fin Assist T2	0.150	0.154	0.072	0.075
	(0.024)	(0.027)	(0.034)	(0.009)
Fin Assist T3	0.297	0.301	0.095	0.135
	(0.026)	(0.035)	(0.0403)	(0.014)
First Gen	-0.129	-0.034		
	(0.021)	(0.017)		
Parent HSD			0.077	0.061
			(0.0390)	(0.021)
Parent SCOL			0.128	0.150
			(0.0379)	(0.028)
Parent Bach			0.216	0.235
			(0.0478)	(0.029)
White	0.116	0.067	0.015	0.034
	(0.026)	(0.038)	(0.036)	(0.018)
Hispanic	0.107	0.036	-0.016	0.018
	(0.031)	(0.045)	(0.044)	(0.021)
GPA Med			0.214	0.159
			(0.0348)	(0.015)
GPA High			0.3724	0.424
			(0.0371)	(0.025)

Table B.13: Targeted vs simulated OLS regression coefficients from indirect inference.

Table B.14: Key Internal Parameter Results

Parameter	Description	Estimate
$\gamma_{p,0}$	Belief Constant	0.0057
		(0.0133)
$\gamma_{p,b}$	Belief: Meas Belief	0.88***
		(0.0103)
$\gamma_{p,h}$	Belief: P-Edu HSD	0.026**
		(0.0116)
$\gamma_{p,s}$	Belief: P-Edu SCOL	0.028***
		(0.0103)
$\gamma_{p,c}$	Belief: P-Edu Bach	0.055***
		(0.0102)
σ_p	Belief: Var Error	0.00018***
		(0.000043)
$\mu_{d,0}$	Non Pecun Util: Black 1st Gen Col Stud	-0.000056
		(0.000044)
$\mu_{d,C}$	Non Pecun Util: Col Edu Parents	0.00004
		(0.000037)
$\mu_{d,W}$	Non Pecun Util: White	0.000017
		(0.000028)
$\mu_{d,H}$	Non Pecun Util: Hispanic	0.000023
		(0.000034)
$\sigma_{d,1}$	Non Pecun Util Scale pd 1	0.000043
		(0.000066)
$\sigma_{d,2}$	Non Pecun Util Scale pd 2	0.000027
		(0.000066)
$\mu_c(\tau_h)$	Non Pecun Util high	0.00052***
		(0.000065)
$\mu_c(\tau_l)$	Non Pecun Util high	-0.0028***
		(0.00031)
$tuit_1$	Tuition Pd 1	\$7583.61***
		(120.5)
$tuit_2$	Tuiton Pd 2	\$6972.45***
		(16.05)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.14: Complete list of estimated parameters from indirect inference

B.6 Mismatch by Net Worth, Parental Edu, Race, and Ethnicity

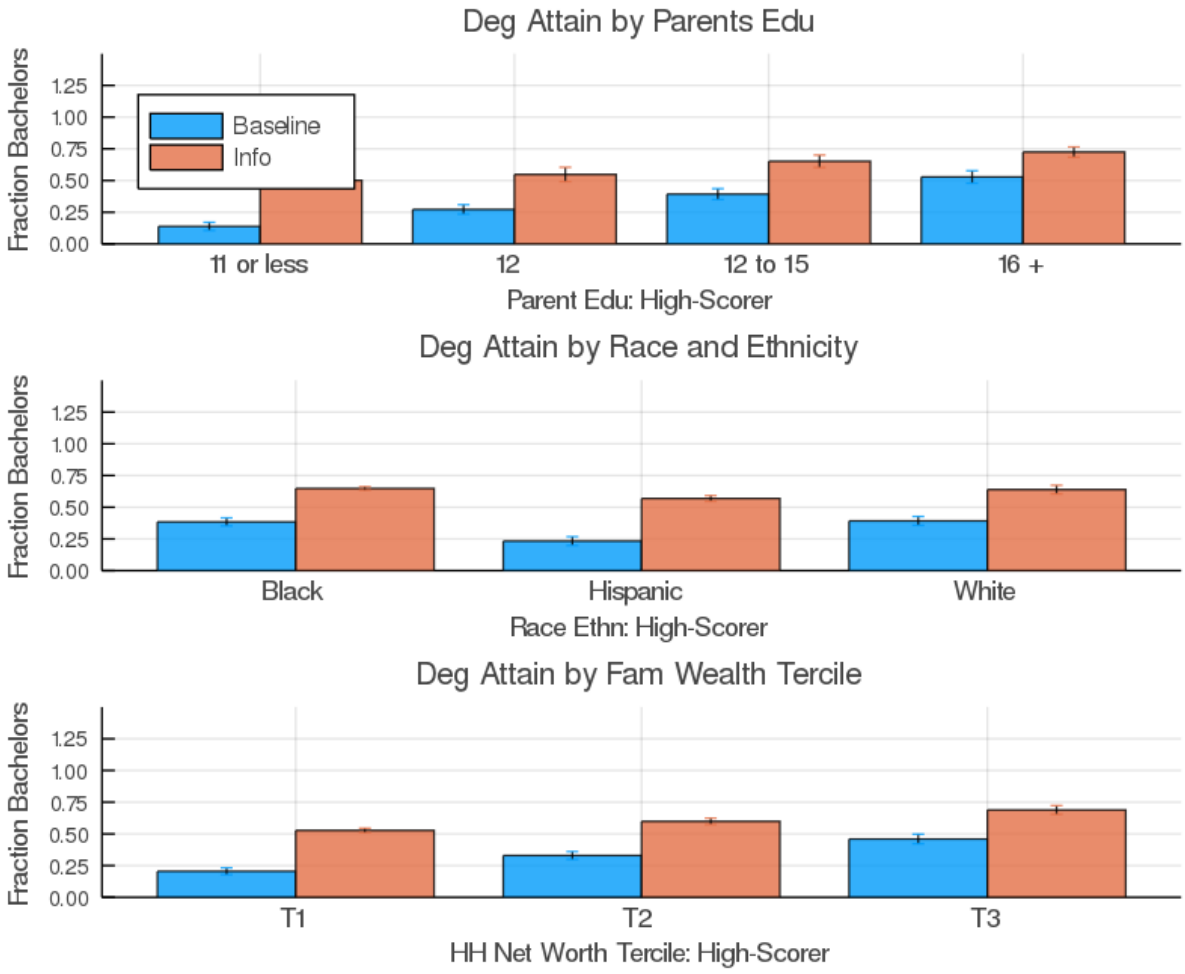

Figure B.2: High scorer BA under baseline model and complete information.

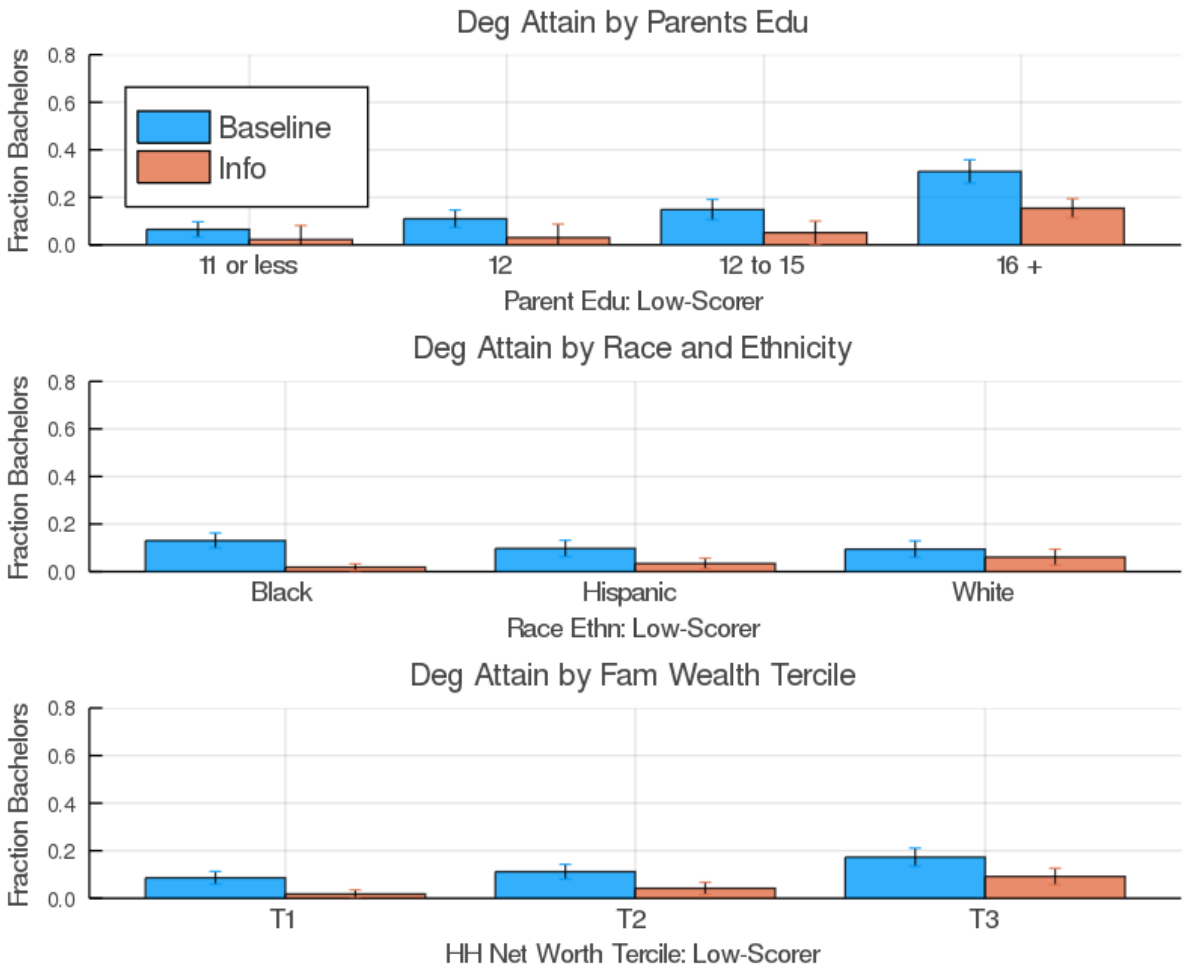

Figure B.3: Low scorer BA under baseline model and complete information.

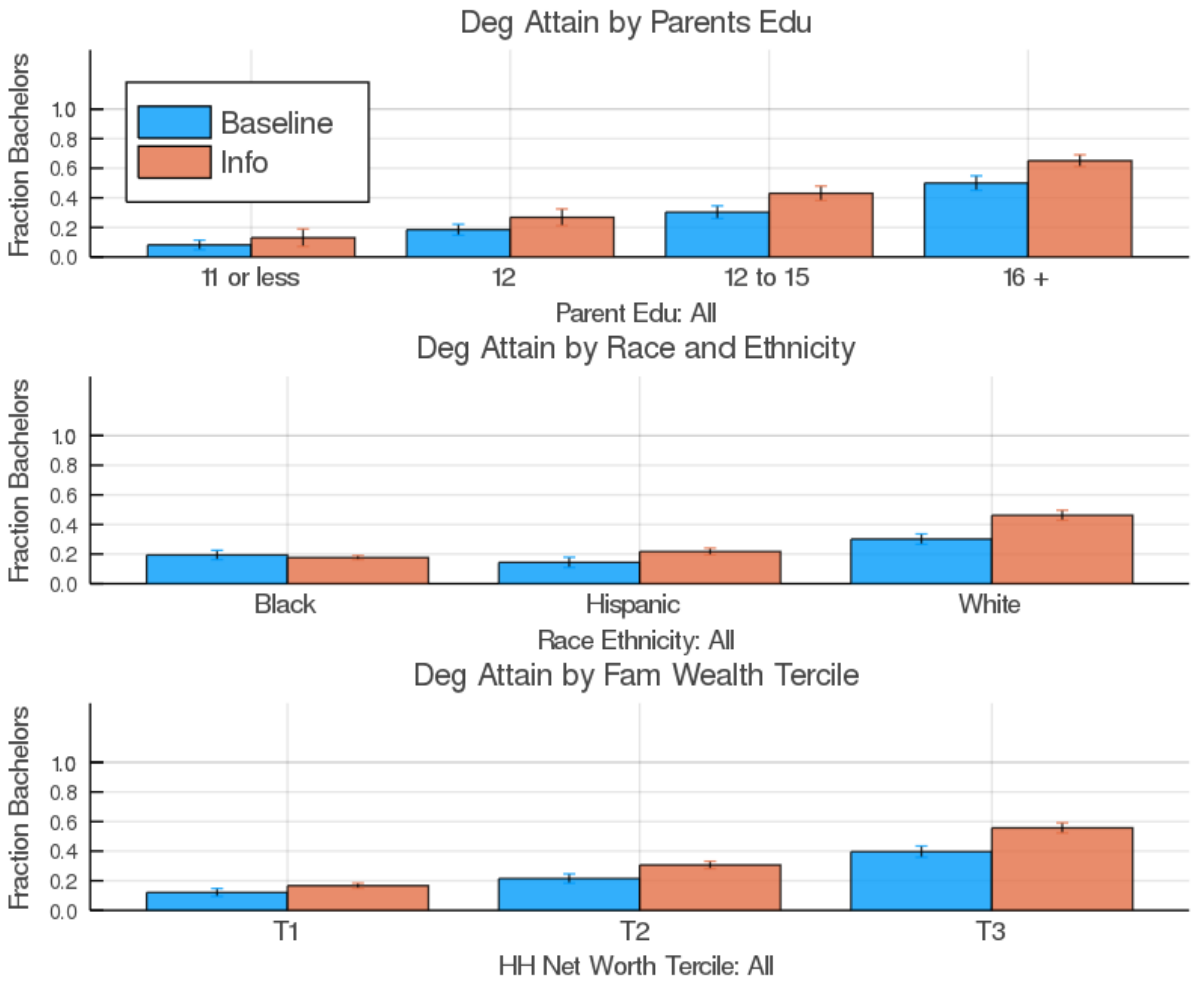

Figure B.4: Overall BA difference under baseline model and complete information.

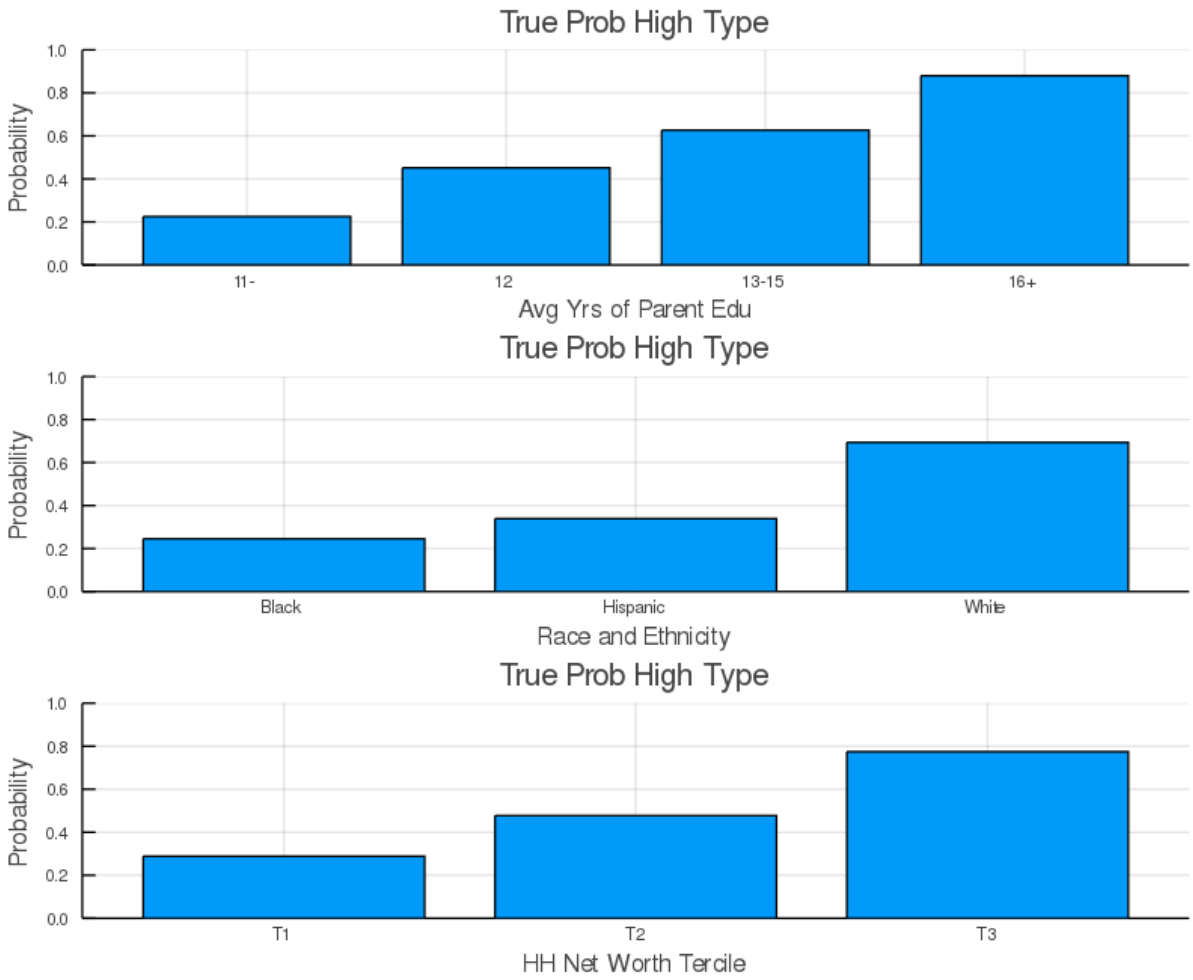

Figure B.5: Estimated fraction of high-scorers by demographic background from finite mixture model.

B.7 Additional Tables

VARIABLES	(1) Ever Enrolled	(2) Ever Enrolled	(3) Ever Enrolled	(4) Ever Enrolled
Avg Parent Education	0.0292***	0.0300***	0.0278***	0.0293***
	(0.0052)	(0.0071)	(0.0071)	(0.0052)
HH Net Worth ($1000s)	0.0001***	0.0001	0.0001**	0.0001***
	(0.0000)	(0.0000)	(0.0001)	(0.0000)
ASVAB AFQT	0.0055***	0.0051***	0.0054***	0.0055***
	(0.0004)	(0.0005)	(0.0006)	(0.0004)
Belief_Var	0.3226***			
	(0.0346)			
Prob Degree		0.4294***		
		(0.0516)		
Prob Enroll			0.2959***	
			(0.0433)	
Born After 82 X Prob Enroll				0.3046***
				(0.0406)
Born Before 82 X Prob Degree				0.3551***
				(0.0521)
Female	0.0831***	0.0695***	0.0870***	0.0817***
	(0.0175)	(0.0236)	(0.0244)	(0.0176)
Hispanic	0.0812***	0.0824**	0.0680*	0.0822***
	(0.0302)	(0.0413)	(0.0396)	(0.0303)
Black	0.1700***	0.1465***	0.1831***	0.1701***
	(0.0266)	(0.0367)	(0.0365)	(0.0266)
Constant	-0.2972***	-0.3428***	-0.3564***	-0.3204***
	(0.0873)	(0.1224)	(0.1143)	(0.0928)
Geography Controls	Yes	Yes	Yes	Yes
Birth Year	Yes	Yes	Yes	Yes
Non Cognitive Controls	Yes	Yes	Yes	Yes
Observations	2,133	1,143	1,139	2,133
R-squared	0.3499	0.3792	0.3444	0.3502

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.15: Shows the difference in coefficients by using different measures of beliefs about education outcomes

VARIABLES	(1) Bachelors Ever	(2) Bachelors Ever	(3) Bachelors Ever	(4) Bachelors Ever
Avg Parent Education	0.0375***	0.0277***	0.0449***	0.0377***
	(0.0056)	(0.0077)	(0.0077)	(0.0056)
HH Net Worth ($1000s)	0.0002***	0.0003***	0.0002**	0.0002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
ASVAB AFQT	0.0057***	0.0056***	0.0055***	0.0056***
	(0.0004)	(0.0005)	(0.0006)	(0.0004)
Belief_Var	0.2151***			
	(0.0283)			
Prob Degree		0.3147***		
		(0.0445)		
Prob Enroll			0.1739***	
			(0.0351)	
Born After 82 X Prob Enroll				0.1864***
				(0.0328)
Born Before 82 X Prob Degree				0.2670***
				(0.0458)
Female	0.0847***	0.0650**	0.0957***	0.0825***
	(0.0186)	(0.0258)	(0.0252)	(0.0187)
Hispanic	0.0535*	-0.0029	0.0911**	0.0551*
	(0.0286)	(0.0394)	(0.0396)	(0.0286)
Black	0.1487***	0.1463***	0.1356***	0.1489***
	(0.0256)	(0.0361)	(0.0343)	(0.0256)
Constant	-0.6214***	-0.5570***	-0.6850***	-0.6584***
	(0.0770)	(0.1007)	(0.1050)	(0.0793)
Geography Controls	Yes	Yes	Yes	Yes
Birth Year	Yes	Yes	Yes	Yes
Non Cognitive Controls	Yes	Yes	Yes	Yes
Observations	2,133	1,143	1,139	2,133
R-squared	0.3612	0.3720	0.3619	0.3619

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.16: Shows the difference in coefficients by using different measures of beliefs about education outcomes

VARIABLES	(1) Continue Coll	(2) Continue Coll	(3) Continue Coll	(4) Continue Coll
Avg Parent Education	0.0429***	0.0239**	0.0545***	0.0428***
	(0.0069)	(0.0094)	(0.0096)	(0.0069)
HH Net Worth ($1000s)	0.0001**	0.0002**	0.0000	0.0001*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
ASVAB AFQT	0.0034***	0.0029***	0.0036***	0.0034***
	(0.0006)	(0.0007)	(0.0008)	(0.0006)
Avg College GPA	0.1788***	0.1900***	0.1688***	0.1787***
	(0.0152)	(0.0203)	(0.0210)	(0.0152)
Belief_Var	0.2262***			
	(0.0498)			
Prob Degree		0.3469***		
		(0.0813)		
Prob Enroll			0.1743***	
			(0.0603)	
Born After 82 X Prob Enroll				0.2031***
				(0.0584)
Born Before 82 X Prob Degree				0.2686***
				(0.0855)
Total Govt/Inst Aid ($1000s)	0.0057**	0.0089**	0.0029	0.0055**
	(0.0027)	(0.0039)	(0.0031)	(0.0027)
Total Family Aid ($1000s)	0.0072**	0.0050	0.0082	0.0072**
	(0.0035)	(0.0040)	(0.0058)	(0.0035)
College_STUDLOAN_TTL	-0.0071**	-0.0102*	-0.0030	-0.0070**
	(0.0034)	(0.0054)	(0.0044)	(0.0035)
Female	0.0397*	0.0146	0.0660**	0.0386
	(0.0238)	(0.0325)	(0.0329)	(0.0238)
Hispanic	0.0594	-0.0318	0.1055*	0.0607
	(0.0382)	(0.0515)	(0.0540)	(0.0383)
Black	0.1797***	0.1755***	0.1620***	0.1799***
	(0.0353)	(0.0489)	(0.0478)	(0.0353)
Constant	-1.0271***	-0.9545***	-1.0609***	-1.0600***
	(0.1213)	(0.1720)	(0.1589)	(0.1309)
Geography Controls	Yes	Yes	Yes	Yes
Birth Year	Yes	Yes	Yes	Yes
Non Cognitive Controls	Yes	Yes	Yes	Yes
Observations	1,467	799	771	1,467
R-squared	0.3238	0.3374	0.3388	0.3241

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.17: Shows the difference in coefficients by using different measures of beliefs about education outcomes