ATTRACTIVENESS, EDUCATION AND MARRIAGE MARKET OUTCOMES

A Dissertation

by

PIAN ZHANG

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Chair of Committee,	Li Gan
Committee Members,	Joanna Lahey
	Manuelita Ureta
	Yuzhe Zhang
Head of Department,	Timothy Gronberg

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ABSTRACT

This dissertation studies the interrelationship among attractiveness, education and marriage market outcomes.

In Section 2, I first examine individuals attractiveness in four dimensions: anthropometric measures (e.g. height and BMI), physical attractiveness, personality attractiveness and grooming, using a unique data set called Add Health. I find that height has positive effects on men's perceived physical attractiveness, but no significant non-zero effects on women. A higher BMI decreases an individual's physical attractiveness on average. However, if the square of BMI is considered, it is shown that thinner women, and stronger men have higher ratings of physical attractiveness. Physical attractiveness, personality attractiveness and grooming are positively correlated with each other. Then I studied how the four attractiveness measures affect peoples socioeconomic outcomes simultaneously. I find that, with all dimensions of attractiveness considered, physical attractiveness still has significant effects on individuals' earnings and spouses' education. Finally, I investigate the source of the penalty and premia of grooming in the labor market. The DID model provides some evidence that there exists general employer discrimination against bad looks.

Section 3 studies pre-marital education investment strategies developed by heterogeneous individuals. People with different attributes or marriage incentives form different marriage prospects when making their college decisions, which leads to distinct investment strategies. Overall, people with lower abilities are less likely to go to college than their high-ability cohorts. Low-ability individuals who value current wealth and expected future earnings in a relationship ("marrying-for-money" type) are more likely to go to college than their cohorts who prefer desirable attributes

or matching qualities ("marrying-for-love" type). Empirically, this paper adopts the mixture density model to capture the unobserved types of marriage incentives. Data from National Longitudinal Study of Adolescent Health provides supportive evidence. It is estimated that there are over 60 percent of people who belong to the "marrying-for-money" type in the sample. The "marrying-for-love" type of people have higher percentages of attending college on average.

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1. INTRODUCTION

Many studies have established the fact that a person's attractiveness level has effects on his socioeconomic outcomes. Hamermesh and Biddle (1994) first examined the relationship between beauty and labor market. They found some evidence of a positive impact of people's physical appearances on their earnings. More specifically, the penalty for plainness among men is about 9 percent in hourly earnings, and the premium for beauty is about 5 percent. After this seminal work, Hamermesh in his following papers, continually found that physical appearances have significant impacts on various outcomes. For example, male attorney's probability of attaining an early partnership rises with beauty (Biddle and Hamermesh, 1998); instructors receive higher instructional ratings if they are good looking (Hamermesh and Parker, 2005); personal beauty raises happiness (Hamermesh and Abrevaya, 2013). Other researchers also found evidence of physical attractiveness's significant effects on people's lives (Mocan and Tekin, 2006; Hitsch et al., 2010). In most of these studies, physical attractiveness was assessed either by undergraduate students using facial frontal photographs, by self-rating, or by interviewer rating at the end of the interview.

Although many studies have shown the effects of physical attractiveness on socioeconomic outcomes, few researched the transmission channels of beauty premium and plainness penalties. There are at least four possibilities: First, an individual's physical attractiveness is his or her associated with anthropetric attributes, such as height and BMI. Anthropometric attributes affect people's socioeconomic outcomes. A large literature has studied this relationship. Averett and Korenman (1996) found that obese women have lower family incomes than their cohorts whose BMI is in

the "recommended" range. Case and Paxson (2008) showed that, for both men and women, an increase in height of four inches leads to an earnings premium of approximately 10 percent. Second, physical attractiveness affects one's personality attractiveness, for example, one's confidence level, and therefore affects the socioeconomic outcomes. Mobius and Rosenblat (2006) showed that physically-attractive workers have higher levels of confidence and higher confidence increases earnings. Third, grooming affects physical attractiveness (Hamermesh et al., 1999; Lee et al., 2015), and grooming may also have effects on individuals' socioeconomic outcomes. Fourth, physical attractiveness itself affects socioeconomic outcomes. Identifying these channels are important to the understanding of attractiveness and socioeconomic outcomes. Section 2 of this dissertation use data from four waves of Add Health. I found that, with anthropometric attributes, personality attractiveness and grooming considered, physical attractiveness still has significant effects on individuals' earnings and spouses' education.

Then, in Section 3, I study the interrelationship between education and marriage market outcomes. Many studies have shown that education has large effects on ones marriage outcomes (Becker, 1973; Lefgren and McIntyre, 2006; Bruze et al., 2015). But few research effort have looked into the interrelationship between education and marriage in a reverse way. This gap is surprising, if individuals are indeed forward-looking, marriage prospect should be anticipated and may potentially modify pre-marital education decisions. Marriage incentives affect marriage prospects. For people who value money in a relationship, their goal on the marriage market is to find wealthy spouses or spouses with large potential earning power, and minimize costs that may incur at the same time. Therefore they would develop education investment strategies to maximize their utilities. Based on these facts, I argue that individuals make college decisions with future marriages in mind. Since different

marriage incentives will generate different marriage prospects, thus they will result in different education investment behaviors in early adulthood. Results in Section 3 show that Low-ability individuals who value current wealth and expected future earnings in a relationship ("marrying-for-money" type) are more likely to go to college than their cohorts who prefer desirable attributes or matching qualities ("marrying-for-love" type).

Section 4 summarizes this dissertation.

2. DECIPHERING ATTRACTIVENESS: HOW IT IS RELATED TO ANTHROPOMETRIC AND SOCIOECONOMIC OUTCOMES

2.1 Introduction

It has long been recognized that physical attractiveness has effects on economic behavior and socioeconomic outcomes. The related literature can be split into two main streams. One stream studied the economic returns to beauty, and the other researched on how anthropometric attributes, such as height, weight and body mass index (BMI) affects socioeconomic outcomes.

The literature that studied beauty found that better-looking people earn higher wages, have higher educated spouses, are more likely to receive first-contact emails on dating websites than average-looking people and lead happier lives (Hamermesh and Biddle, 1994; Hitsch et al., 2010; Hamermesh and Abrevaya, 2013). In most of these studies, physical attractiveness was assessed either by undergraduate students using facial frontal photographs, by self-rating, or by interviewer rating at the end of the interview.

The work on anthropometric attributes also uncovered some interesting patterns. Case and Paxson (2008) showed that for both men and women, an increase in height of four inches leads to an earnings premium of approximately 10 percent. Gregory and Ruhm (2009) examined the relationship between BMI and wages. They found that BMI has a negative impact on earnings for women, but few consequences for men. In the marriage market, Hitsch et al. (2010) found that women prefer tall men, but men prefer medium sized women. For example, on the dating website, if the height of a man is in the 6'3" - 6'4" range, then he would receive 65% more first-contact e-mails than his cohort whose height is in the 5'7" - 5'8" range. For women,

a tall woman with a height of 6'3" receives 42% fewer e-mails than a woman who is 5'5".

It is clear that these two streams of literature relate to each other closely. They studied the same question: how do physical attributes affect socioeconomic outcomes? They both got similar answers: people who were endowed with good physical attributes, e.g. more beautiful, taller, fitter, receive premiums in the markets, such as the labor market, dating market and marriage market. Despite the likeness, however, the main research subjects of these two streams of literature are different. Height and fitness only describe the shape of the body, but beauty may suggest either a good-looking face or being well groomed. They may be positively correlated, but they are not identical in meaning. Therefore, it is important to study the relationship of anthropometric characteristics and beauty, and how they affect economic behavior and socioeconomic outcomes together. The interesting question is whether anthropometric characteristics affect socioeconomic outcomes through the same channel as beauty. If so, then height and fitness is simply an approximation of beauty in those studies. If not, then height and fitness has its own premium in the markets.

One potential problem in the studies of beauty is that when people assess someone's beauty, it is difficult to solely consider his or her facial features or body fitness without taking grooming into consideration. Even if he or she has a good-looking face, a shabby look may still put the rater off. A recent study shows that people wearing the luxury brand apparel receive preferential treatment over those not wearing luxury brand logos (Lee et al., 2015). Especially, in their experiment, they found that people wearing the luxury brand logo, i.e. Louis Vuitton, have higher perceived attractiveness score (5.03) than people wearing the non-luxury brand logo (4.52), i.e. H&M, and people wearing no logo (4.83). It is therefore reasonable to believe that people who are well groomed would receive higher scores in the ratings of those

studies. This, therefore, could generate a form of measurement error, lowering the efficiency of the estimates.

Besides grooming, another attractiveness variable that also should have been studied under this framework is personality attractiveness. There are two reasons. First, beauty premium in the labor market is explained in two different ways by different researchers. Some argued that sex appeal is the main reason for the beauty premium. For example, a cosmetic saleswoman is better able to sell to customers if she is good looking. Other researchers believe that beautiful people are more likely to have desirable personality traits, for example high self-confidence. "It is the general sparkle of one's personality, not one's beauty, that increases earnings" (Hamermesh, 2011). Therefore, studying personality attractiveness can help the understanding of beauty premium. Second, more and more companies are giving job candidates personality tests in their hiring process. According to a testing company, the workplace personality testing is now a 500-million-a-year business. And it is growing fastly with a growth rate estimated to be 10 to 15 percent a year.[1] However, to the best of my knowledge, there is no paper that studies how personality attractiveness affects people's socioeconomic outcomes.

In this paper, I first study the interrelationship among anthropometric characteristics, physical attractiveness, grooming and personality attractiveness. Then I investigate how these attractiveness variables affect people's socioeconomic outcomes. I use nationally representative data where the height and weight of each respondent was measured during the interview process and the interviewer assesses the respondent's physical attractiveness, grooming and personality attractiveness as soon as he finished the interview. This unique dataset enables me to answer the following questions: First, do anthropometric characteristics explain physical attractiveness?

[1] http://www.wsj.com/articles/are-workplace-personality-tests-fair-1412044257

Second, do anthropometric characteristics affect socioeconomic outcomes through the same channel as physical attractiveness? Third, how do anthropometric characteristics, physical attractiveness, grooming and personality attractiveness affect socioeconomic outcomes simultaneously? Fourth, what are the sources of the penalties and premia for attractiveness? Specifically, does there exist general employer discrimination on people's attractiveness?

The results suggest that both height and BMI have significant effects on a man's physical attractiveness, but only BMI matters for women's physical attractiveness. BMI does not have a significant impact on men's earnings, but has a negative effect on women's earnings even after physical attractiveness is considered in the model. With all the attractiveness variables and anthropometric measures considered, grooming seems to be the most important factor that affects people's socioeconomic outcomes. However, after using instruments to solve the endogeneity issue, grooming has no significant effects. The coefficients for the physical attractive and the physical unattractive in the full sample model are both sizable and significant, indicating that there exists a penalty for bad looks and a premium for good looks. For men, only the premium is significant. On spouse's education, I find that physical attractiveness is more important to men, while BMI is more important to women. By considering the sorting of occupation in the model, I provide some evidence for the existence of general employer discrimination against bad looks. Lastly, I investigate how personality affects one's earnings and find that an individual's confidence level has significant effect.

This paper is set up as follows: Section 2 describes the data. Section 3 estimates whether anthropometric characteristics explain physical attractiveness using least square regressions. Section 4 studies the interrelationship of anthropometric measures, attractiveness and socioeconomic outcomes. Section 5 considers all the at-

tractiveness variables and its role in the labor market and marriage market. Section 6 studies the sources of the penalities and premia for physical attractiveness in the labor market. Section 7 interprets the effects of personality attractiveness. Section 8 concludes the paper.

2.2 Data Description

The data I use in this paper is the National Longitudinal Study of Adolescent to Adult Health (Add Health). It is a longitudinal study of adolescents in grades 7-12 in the United States during the 1994-95 school year. Add Health studies respondents' social, economic, psychological and physical well-being. It also has information on respondents' family, school, neighborhood backgrounds. Four in-home surveys were conducted in 1994-95, 1996, 2001-02, and 2007-08.

In each survey, interviewers measured the height and weight of respondents during the interview. Then, BMI is calculated using the BMI formula. After the interview, each interviewer fills out an interviewer's report for the respondent he just interviewed. In the report, three questions of interest were asked: "How physically attractive is the respondent?" "How attractive is the respondent's personality?" "How well groomed is the respondent?" A five-point scale for both physical attractiveness and personality attractiveness was composed of the following choices: "very unattractive", "unattractive", "about average", "attractive" and "very attractive". A five-point scale of grooming was composed of the following choices: "very poorly groomed", "poorly groomed", "about average", "well groomed" and "very well groomed". Add Health requires that the interviewer should complete the interviewers report in a location that is not the respondent's home as soon as he finished the whole survey.

Two socioeconomic outcomes are considered in this paper: the log of hourly wage

rate if the respondent has a full time job and the current spouse's education if the respondent is married. A set of variables are controlled in the analysis: age, gender, race, a survey year dummy-variable indicators, self-reported health status and education. I also examine the individuals standardized Peabody Picture Vocabulary Test (PVT) score as a measure of cognitive ability. The test scores are standardized by age and grade. Family wealth and mother's education are also considered.

Since Add Health is a longitudinal study, each respondent has multiple values for each variable. I use all the values that were recorded most recently (Wave IV) for the main analysis, considering that most respondents were still adolescents in the first three waves. However, since each respondent's attractiveness in Wave IV was rated by one single interviewer and different interviewers might have different standards for attractiveness, a form of measurement error may exist and would lower the efficiency of my estimates. Also, even though physical attractiveness can be regarded as an exogenous variable, a person's environment and some socioeconomic attributes influence his personality attractiveness and grooming. Therefore, an endogeneity problem may arise if I only use Wave IV's attractiveness variables in the analysis. To solve these two problems, for each attractiveness variable, I use the average of the four independent ratings in four in-home interviews as a proxy for the true underlying attractiveness.

Table 2.1 presents the descriptive statistics for the full sample, male and female respondents, separately. The average age of the sample is 29. Women report to be less healthy than men, but have higher scores in physical attractiveness, personality attractiveness and grooming. This is consistent with many studies reporting that women are rated more attractive than men on average (Hamermesh and Biddle, 1994; Gehrsitz, 2014; Doorley and Sierminska, 2015). The anthropometric measures of this data set are realistic and comparable to other national data (eg. IHIS).

Table 2.1: Descriptive Statistics

	full sample	male	female
N	15701	7349	8352
Age	29.10	29.20	29.01
	(1.75)	(1.76)	(1.75)
Height(cm)	169.87	177.14	163.46
	(10.13)	(7.83)	(7.17)
BMI	29.14	29.02	29.25
	(7.54)	(6.72)	(8.20)
Physical Attractiveness	3.51	3.43	3.57
	(0.56)	(0.52)	(0.58)
Personality Attractiveness	3.62	3.55	3.69
	(0.55)	(0.53)	(0.56)
Grooming	3.52	3.44	3.59
	(0.52)	(0.50)	(0.53)
General Health	3.65	3.70	3.62
	(0.92)	(0.91)	(0.92)
Completed College	0.32	0.28	0.35
	(0.46)	(0.45)	(0.48)
White	0.70	0.71	0.69
	(0.46)	(0.45)	(0.46)
Currently Student	0.17	0.14	0.20
	(0.37)	(0.34)	(0.40)
Personal Annual Income (thousands)	35.54	41.98	29.40
	(38.09)	(40.34)	(34.73)
Hourly Wage	16.32	18.27	14.60
	(19.18)	(19.40)	(18.81)
Married	0.49	0.45	0.53
	(0.50)	(0.50)	(0.50)
Number of Children	0.94	0.75	1.10
	(1.16)	(1.09)	(1.20)
Mother High School Grad	0.82	0.84	0.82
	(0.39)	(0.37)	(0.39)

2.3 Do Anthropometric Characteristics Explain Physical Attractiveness?

This section investigates the predictive power of a person's measured anthropometric characteristics in explaining his interviewer-rated physical attractiveness.

Table 2.2 displays the results of a series of least square regressions of attractiveness on anthropometric measures for men. In Column (1) and (2), the results are the estimates corresponding to the baseline regression, which only controls for the age and race of the respondent. If I control for interviewer fixed effects, the results are robust. Finally, I control for a health dummy and the number of children, which does not change the findings, as we see in Column (4). Table 2.3 reports results for women.

Table 2.2: LS Regressions of Physical Attractiveness on Anthropometric Measures. Men.

	(1)	(2)	(3)	(4)
Height	0.015***	0.013***	0.013***	0.013***
	(0.003)	(0.003)	(0.003)	(0.003)
BMI	-0.014***	0.036***	0.039***	0.043***
	(0.001)	(0.007)	(0.007)	(0.007)
BMI^2		-0.0007***	-0.0008***	-0.0008***
		(0.0001)	(0.0001)	(0.0001)
Baseline controls?	YES	YES	YES	YES
Interviewer FE?	NO	NO	YES	YES
Additional controls?	NO	NO	NO	YES
Adjusted R-squared	0.020	0.026	0.17	0.186
N	7214	7214	7214	7200

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It is worth noting that the signs of BMI and the square of BMI for women are negative and positive respectively. This means that on average an increase in BMI

Table 2.3: LS Regressions of Physical Attractiveness on Anthropometric Measures. Women.

	(1)	(2)	(3)	(4)
Height (inches)	0.003	0.004	0.003	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
BMI	-0.026***	-0.048***	-0.046***	-0.042***
	(0.001)	(0.006)	(0.005)	(0.005)
BMI^2		0.0003**	0.0003***	0.0003***
		(0.0001)	(0.0001)	(0.0001)
Baseline controls?	YES	YES	YES	YES
Interviewer FE?	NO	NO	YES	YES
Additional controls?	NO	NO	NO	YES
Adjusted R-squared	0.062	0.063	0.227	0.231
N	8209	8209	8209	8160

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

would decrease womens perceived physical attractiveness, but the rate of the decline decreases as the BMI increases. However, the signs of BMI and the square of BMI for men are completely opposite, which means that on average an increase in BMI would increase men's perceived physical attractiveness, but the rate of the incline decreases as the BMI increases. This finding suggests that, in our times, people prefer women to be thinner. But for men, higher BMIs are more welcomed, which may suggest that people prefer men to be stronger. This finding helps to explain why some studies found that the BMI values do not affect mens socioeconomic outcomes as much as they affect women's.

The other finding is that height has a significant effect on men's physical attractiveness, but barely any effect on women's. This may imply that body fitness is more important to women than absolute height. And to some extent, this finding coincides with Hitsch et al. (2010) study result that medium sized women are more popular than tall women in the dating market.

2.4 Physical Attractiveness, Anthropometric Measures and Socioeconomic Outcomes

In this section, I study how physical attractiveness and anthropometric measures affect two important outcomes in the labor market and the marriage market, namely, hourly wages and current spousal education simultaneously.

Table 2.4: LS Regressions of Log Hourly Wage Rate on Physical Attractiveness and Anthropometric Measures. Full Sample.

	(1)	(2)	(3)
Height (inches)	0.003		0.002
	(0.004)		(0.004)
BMI	-0.004***		-0.003
	(0.001)		(0.001)
Physical Attractiveness		0.078 ***	0.072***
		(0.013)	(0.013)
Education	0.123 ***	0.122***	0.121***
	(0.006)	(0.006)	(0.006)
Standardized PVT score	0.002***	0.002***	0.002***
	(0.0004)	(0.0004)	(0.0004)
N	6836	6922	6836

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results shown in Table 2.4, Table 2.5 and Table 2.6 are a series of least square regressions where the dependent variable is the log hourly wage rate. Regressions in Table 2.4 use the full sample. Table 2.5 and Table 2.6 present separate analysis for men and women. In each table, I present three specifications: First, only have anthropometric measures (height and BMI) in the regressions. The results are presented in Column (1); Second, only have physical attractiveness in the regressions. The results are presented in Column (2); Third, include both physical attractiveness

Table 2.5: LS Regressions of Log Hourly Wage Rate on Physical Attractiveness and Anthropometric Measures. Men.

	(1)	(2)	(3)
Height (inches)	0.006		0.007
	(0.005)		(0.005)
BMI	0.002		0.002
	(0.002)		(0.002)
Physical Attractiveness		0.083***	0.084***
		(0.018)	(0.017)
Education	0.101***	0.097***	0.098***
	(0.008)	(0.008)	(0.008)
Standardized PVT score	0.001*	0.001*	0.001*
	(0.0006)	(0.0006)	(0.0006)
N	3463	3505	3463

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.6: LS Regressions of Log Hourly Wage Rate on Physical Attractiveness and Anthropometric Measures. Women

	(1)	(2)	(3)
Height (inches)	-0.002		-0.001
	(0.006)		(0.006)
BMI	-0.009***		-0.007***
	(0.002)		(0.002)
Physical Attractiveness		0.078***	0.077***
		(0.018)	(0.018)
Education	0.144***	0.146***	0.143***
	(0.009)	(0.009)	(0.009)
Standardized PVT score	0.002*	0.002**	0.002*
	(0.0006)	(0.0006)	(0.0006)
N	3373	3417	3373

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

and anthropometric measures in the regressions. The results are presented in Column (3). More specifically, the analysis only considers respondents who work full time (the working hours per week are between 30 and 80).

Column (1) in Table 2.4 shows that BMI has a negative impact on earnings, but height does not have a significant non-zero effect on earnings. Column (2) in Table 2.4 shows that physical attractiveness affects earnings positively. The analysis in Column (3) in Table 2.4 considers BMI, height and physical attractiveness simultaneously. The interesting finding is that the coefficient for BMI is not significant any more while the coefficient for physical attractiveness is still sizable and significant. This suggests that, for the full sample, BMI affects earnings through the same channel as physical attractiveness, so when physical attractiveness is considered in the analysis, the effect of BMI becomes less significant. The results in Table 2.5 and Table 2.6 show that BMI always does not have a significant impact on men's earnings, but has a negative effect on women's earnings even after physical attractiveness is considered in the model. This suggests that, for women, BMI has its own premium in the labor market.

It needs to be pointed out that height is not significant in all the subsequent analysis. This contradicts with the results of many previous studies. One possible explanation is that most of those studies use samples with average ages around 40, which is 10 years older than the sample this paper uses. Therefore it is possible that height does not have a significant impact on early adulthood earnings.

Table 2.7, Table 2.8 and Table 2.9 present the least square regression results where the dependent variable is the spouse's education. Add Health did not ask the education level of respondents' spouses in Wave IV, but this question was asked in Wave III. In Wave III, the age range of the sample is 18-26. Most of the respondents were still unmarried at that time. Therefore, the number of observations is only

Table 2.7: LS Regressions of Spouse's Education on Physical Attractiveness and Anthropometric Measures. Full Sample.

	(1)	(2)	(3)
Height (inches)	0.019		0.019
	(0.019)		(0.018)
BMI	-0.033***		-0.028***
	(0.008)		(0.008)
Physical Attractiveness		0.412 ***	0.150*
		(0.029)	(0.065)
Education	0.391 ***	0.412***	0.387***
	(0.030)	(0.029)	(0.030)
Standardized PVT score	0.010***	0.010***	0.010***
	(0.002)	(0.0002)	(0.002)
N	1534	1626	1534

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.8: LS Regressions of Spouse's Education on Physical Attractiveness and Anthropometric Measures. Men.

	(1)	(2)	(3)
Height (inches)	0.060		0.057
	(0.032)		(0.033)
BMI	-0.015		-0.010
	(0.002)		(0.002)
Physical Attractiveness		0.298*	0.318*
		(0.121)	(0.124)
Education	0.440***	0.448***	0.432***
	(0.051)	(0.050)	(0.051)
Standardized PVT score	0.012***	0.010***	0.012***
	(0.004)	(0.004)	(0.004)
N	549	580	549

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.9: LS Regressions of Spouse's Education on Physical Attractiveness and Anthropometric Measures. Women.

	(1)	(2)	(3)
Height (inches)	-0.004		-0.003
	(0.022)		(0.023)
BMI	-0.042***		-0.040***
	(0.009)		(0.010)
Physical Attractiveness		0.126	0.078
		(0.071)	(0.075)
Education	0.355***	0.391***	0.354***
	(0.037)	(0.035)	(0.037)
Standardized PVT score	0.002*	0.002**	0.002*
	(0.003)	(0.002)	(0.003)
N	985	1046	985

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

1534 in the analysis. The results shows that both BMI and physical attractiveness have effects on the spouses' education for the full sample. But for men, only physical attractiveness matters. For women, only BMI matters, which suggests that the perceived physical attractiveness by an interviewer might be different with the physical beauty perceived by a potential mate.

2.5 Physical Attractiveness, Personality Attractiveness and Grooming

In this section, I research how physical attractiveness, personality attractiveness and grooming affect socioeconomic outcomes simultaneously. Table 2.10 presents the correlation matrix of physical attractiveness, personality attractiveness and grooming. They are all positively correlated. Physical attractiveness and personality attractiveness has the highest correlation, while personality attractiveness and grooming has the lowest correlation.

Now I focus on the relationship among three attractiveness measures, anthro-

Table 2.10: The Correlation Matrix of Physical Attractiveness, Personality Attractiveness and Grooming

	physical attractiveness	personality attractiveness	grooming
physical attractiveness	1.000		
personality attractiveness	0.597	1.000	
grooming	0.559	0.497	1.000

Table 2.11: LS Regressions of Log Hourly Wage Rate on Attractiveness and Anthropometric Measures.

	(1) full sample	(2) full sample	(3) male	(4) female
Physical Attractiveness	0.137***	0.081**	0.090*	0.071
/Attractive	(0.026)	(0.029)	(0.040)	(0.044)
Physical Attractiveness	-0.115***	-0.047	-0.035	-0.066
/Unattractive	(0.026)	(0.028)	(0.036)	(0.047)
Personality Attractiveness		-0.017	-0.036	-0.017
/Attractive		(0.032)	(0.048)	(0.044)
Personality Attractiveness		-0.050	-0.065	-0.049
/Unattractive		(0.030)	(0.037)	(0.047)
Grooming/Attractive		0.097***	0.101**	0.088*
		(0.028)	(0.039)	(0.039)
Grooming/Unattractive		-0.159***	-0.127***	-0.212***
		(0.028)	(0.035)	(0.046)
Height (inches)	0.003	0.004	0.006	0.002
	(0.004)	(0.004)	(0.005)	(0.006)
BMI	-0.001	-0.001	0.004	-0.003
	(0.001)	(0.001)	(0.002)	(0.002)
N	6826	6826	3458	3368

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

pometric measures and hourly wage rate conditional on working full-time. Table 2.11 presents the least square results of log hourly wage rate on the three attractiveness variables and anthropometric measures. In all the subsequent analysis, I use categories of attractiveness (unattractive, average and attractive) instead of the real rating scores of attractiveness variables, so that the penalities and premia for attractiveness can be easily identified.

Column (1) shows that, without considering personality attractiveness and grooming, there is a significant penalty for bad looks and a significant premium for good looks. However, after adding the two additional attractiveness variables, grooming becomes the most important factor in the model. Both of the penality and premium are significant.

However, these results are problematic. Although I use average rating scores for all the attractiveness variables to avoid the endogeneity problem, the endogenous item is actually still in the equation because an average is just a linear combination. Personality attractiveness and grooming can be endogenous for two reasons: First, since each individual's personality attractiveness and grooming level was evaluated after the whole survey, it is possible that individuals' socioeconomic status might affect interviewers' ratings. For example, knowing that the respondent has a high wage rate, the interviewer tends to give a high rating score to this respondent's grooming, because the interviewer may think that the respondent was wearing some luxury brand cloth. This leads to a problem called "measurement error", which can cause endogeneity. Second, in this analysis, the research question is how attractiveness affects one's socioeconomic outcomes. However, an individual's socioeconomic outcomes can also affect his or her attractiveness, especially personality attractiveness and grooming. This simultaneity problem is also a cause of endogeneity.

To solve this problem, I adopt interviewer fixed effects as instruments and use

Table 2.12: LS Regressions of Log Hourly Wage Rate on Attractiveness and Anthropometric measures. Interviewer FE Controlled.

	(1)	(2)	(3)
	full sample	male	female
Physical Attractiveness/Attractive	0.097**	0.096*	0.123**
	(0.031)	(0.044)	(0.046)
Physical Attractiveness/Unattractive	-0.074**	-0.085*	-0.053
	(0.031)	(0.039)	(0.051)
Personality Attractiveness/Attractive	0.012	-0.006	0.013
	(0.029)	(0.041)	(0.045)
Personality Attractiveness/Unattractive	-0.063	-0.025	0.130**
	(0.033)	(0.041)	(0.054)
Grooming/Attractive	0.044	0.032	0.049
	(0.031)	(0.044)	(0.044)
Grooming/Unattractive	-0.074**	-0.029	-0.151**
	(0.031)	(0.039)	(0.052)
Height (inches)	0.005	0.009	0.001
	(0.004)	(0.005)	(0.007)
BMI	-0.001	0.003	-0.003
	(0.002)	(0.002)	(0.003)
Interviewer FE	YES	YES	YES
N	5371	2717	2654

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

the two stage least square to estimate the model. I first present LS regressions with interviewer fixed effects controlled. Results are presented in Table 2.12 and Table 2.13. The dependent variables for Table 2.12 and Table 2.13 are log hourly wage rate and current spouse's education, respectively.

Table 2.13: LS Regressions of Spouse's Education on Attractiveness and Anthropometric Measures. Interviewer FE Controlled.

	(1)	(2)	(3)
	full sample	male	female
Physical Attractiveness/Attractive	0.032	-0.085	-0.137
	(0.166)	(0.325)	(0.216)
Physical Attractiveness/Unattractive	-0.008	-0.100	0.192
	(0.178)	(0.349)	(0.231)
Personality Attractiveness/Attractive	0.156	-0.195	0.282
	(0.163)	(0.330)	(0.211)
Personality Attractiveness/Unattractive	0.235	0.152	0.217
	(0.194)	(0.356)	(0.266)
Grooming/Attractive	0.148	-0.339	0.339
	(0.171)	(0.372)	(0.128)
Grooming/Unattractive	-0.492**	-0.661	-0.511**
	(0.183)	(0.353)	(0.253)
Height (inches)	-0.0003	-0.018	0.031
	(0.025)	(0.049)	(0.034)
BMI	-0.026**	0.005	-0.044***
	(0.010)	(0.022)	(0.012)
Interviewer FE	YES	YES	YES
N	1136	385	751

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.14 presents the results of 2SLS regressions of log hourly wage rate on attractiveness and anthropometric measures. For the full sample, the coefficients for physical attractiveness and physical unattractiveness are both sizable and significant, indicating that there exists a penalty for bad looks and a premium for good looks.

But for men, only the premium is significant. These findings are consistent with previous literature.

Table 2.14: 2SLS Regressions of Log Hourly Wage Rate on Attractiveness and Anthropometric Measures.

	(1) full sample	(2) male	(3) female
Physical Attractiveness/Attractive	0.193***	0.189**	0.194***
	(0.048)	(0.060)	(0.059)
Physical Attractiveness/Unattractive	-0.124***	-0.062	-0.142*
	(0.052)	(0.056)	(0.068)
Personality Attractiveness/Attractive	-0.279*	-0.369*	-0.154
	(0.125)	(0.154)	(0.128)
Personality Attractiveness/Unattractive	-0.093	-0.140	-0.006
	(0.115)	(0.117)	(0.143)
Grooming/Attractive	0.107	0.130	-0.075
	(0.109)	(0.116)	(0.111)
Grooming/Unattractive	0.107	0.006	-0.104
	(0.125)	(0.115)	(0.141)
Height (inches)	0.002	0.005	0.0005
	(0.004)	(0.005)	(0.006)
BMI	-0.001	0.003	-0.004
	(0.002)	(0.002)	(0.002)
N	6826	3458	3368

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.15 presents the results of 2SLS regressions of current spouse's education on attractiveness and anthropometric measures. Most of the coefficients are not significant. This implies that what is perceived attractive by an interviewer is different with what makes an individual attractive in the marriage market. The reason might be that the interviewer may simply capture a superficial assessment, but the real personality that matters in the marriage market can only be fully discovered in

one-to-one long-term relationships. However, for women, the BMI has a significant negative impact on the spouses' education, which suggests that thinner women have more advantages in the marriage market.

Table 2.15: 2SLS Regressions of Current Spouse's Education on Attractiveness and Anthropometric Measures.

	(1) full sample	(2) male	(3) female
Physical Attractiveness/Attractive	-0.026	0.057	-0.147
	(0.188)	(0.279)	(0.222)
Physical Attractiveness/Unattractive	-0.224	-0.337	-0.012
	(0.187)	(0.267)	(0.232)
Personality Attractiveness/Attractive	0.342	0.244	0.394
	(0.352)	(0.536)	(0.331)
Personality Attractiveness/Unattractive	0.254	-0.003	0.526
	(0.340)	(0.417)	(0.372)
Grooming/Attractive	0.442	0.998*	0.363
	(0.304)	(0.409)	(0.306)
Grooming/Unattractive	-0.435	-0.577	-0.568
	(0.301)	(0.347)	(0.333)
Height (inches)	0.002	-0.006	0.005
	(0.021)	(0.032)	(0.027)
BMI	-0.084*	-0.001	-0.133**
	(0.042)	(0.002)	(0.045)
N	1216	484	732

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Most of the coefficients for personality attractiveness are not significant in the above analysis. I will research this fact in Section 2.7.

2.6 The Sources of the Penalties and Premia for Physical Attractiveness in the Labor Market

From the above analysis, it is clear that physical attractivness has sizable and significant effects on all the three socioeconomic outcomes that this paper investigates. The next question is what are the sources for these effects? There are two potential answers: First, physical attractiveness may affect a worker's productivity in a specific occupation. This may arise from factors that include the direct effect of physical attractiveness on an individuals productivity, productivity effects on co-workers, or from customer discrimination. A simple example is that physical attractivness is essential to a saleperson, but not that important to a construction worker. People who are good looking would sort themselves into occupations that reward beauty. Second, it may result from employer discrimination against the bad looks.

To empirically distinguish these two sources, I followed Harper (2000) and adopt the following model:

$$ln(\omega_i) = \beta_0 + \beta_1 X_i + \beta_2 OCC_i + \beta_3 g_i + \beta_4 g_i * OCC_i + \epsilon_i$$

where ω_i is the hourly wage rate of individual i, g_i is physical attractiveness, X_i represents a vector of productivity-enhancing attributes, OCC_i is the individual's current occupation, β_3 may be interpreted as the return to physical attractiveness conditional on the current occupation, β_4 represents the differential return to physical attractiveness which is occupation-specifc. If $\beta_3 \neq 0$ and $\beta_4 = 0$, it implies that there exist general employer discrimination against the bad looks.

Add Health recorded each respondent's occupation using the SOC code. The code is very detailed and there are too many occupation groups. In order not to put too many interaction terms into the regression, I use two proxies for occupations. Add

Table 2.16: Attractiveness, Occupation, and Earnings

	(1)		(2)
Physical Attractiveness/Attractive	0.095	Physical Attractiveness/Attractive	0.140*
	(0.078)		(0.061)
Physical Attractiveness/Unattractive	-0.147*	Physical Attractiveness/Unattractive	-0.162*
	(0.074)		(0.066)
Moderate Physical Work	-0.039	Do not Supervise	-0.162***
	(0.050)		(0.036)
Light Physical Work	-0.079		
	(0.052)		
Seated	0.173***	Supervise Supervisors	-0.063
	(0.056)		
Moderate Physical Work/Attractive	0.090	Do not Supervise /Attractive	0.048
	(0.089)		(0.057)
Light Physical Work/Attractive	0.053		
	(0.091)		
Seated/Attractive	0.052	Supervise Supervisors /Attractive	0.205*
	(0.082)		(0.091)
Moderate Physical Work/Unattractive	0.042	Do not Supervise /Unattractive	0.043
	(0.079)		(0.058)
Light Physical Work/Unattractive	-0.007		
	(0.080)		
Seated/Unattractive	0.032	Supervise Supervisors /Unattractive	0.142
	(0.073)		(0.093)
N	6023		6826

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Health asked respondents two questions related to their daily work. The first question is, "In your current primary job, do you spend most of your time (blank)". The following choices were provided: "standing, doing hard physical work, for example, doing construction work", "standing, doing moderate physical work, for example, nursing or being a mechanic", "standing, doing light physical work, for example, standing at a counter, teaching, or working at a conveyer belt" and "seated, for example, using a computer or driving". The second question is "Thinking about your official job duties, which of the following statements best describes your supervisory responsibilities at your (current/most recent) primary job?" The choices are: "I (supervise/supervised) other employees", "I (supervise/supervised)other employees, some of whom (supervise/supervised) others", "I (do/did) not supervise anyone". I interacted these answers with the groups of physical attractiveness and put them in the model. The results are presented in Table 2.16. The coefficient for the unattractive group is significant and negative, while almost all the coefficients for interaction terms are all non-significant. According to the model, this indicates that there exists general employer discrimination against the bad looks.

2.7 Interpreting Personality Attractiveness

As it is shown above, personality attractiveness does not have significant impact on the two socioeconomic outcomes that I investigate. In Table 2.14 Column (1) and (2), the coefficients for attractive personality are significant but negative, which suggests that people who are attractive in personality have lower wage rates. This contradicts with our intuitions. Nowadays many companies ask job candidates to take personality tests before or during interviews, researchers may expect that people who have attractive personalities would be more likely to be hired and receive higher wages than their unattractive cohorts. But the results of the estimation are just the

opposite.

One possible explanation is that personalities rated by interviewers in the survey are different with personalities that companies would assess in the hiring processes. Add Health does not provide a clear definition for the personality attractiveness in their study. It is possible that survey administrators rated personalitiy attractiveness according to whether they like respondents' personalites instead of assessing if respondents' personalities are attractive in the workplace.

According to a report written by Universum, a survey that has over 400,000 students and professionals worldwide participated shows that the five personality traits that employers values most in 2012 are the following: professionalism (86%), high-energy (78%), confidence (61%), self-monitoring (58%) and intellectual curiosity (57%). [2] Although the personality attractiveness variable may not be a good measure for personality, Add health provides detailed personality measures by asking respondents a series of subjective questions. For example, "Do you agree or disagree that you feel loved and wanted?", "You never get sad.". And the provided choices are: "strongly agree", "agree", "neither agree nor disagree disagree", "strongly disagree". From these questions, I select out two questions that are related to workplace personalities: "Do you agree or disagree that you have a lot of good qualities?" and "Do you agree or disagree that you have a lot to be proud of." These two questions assess respondents' confidence level, which has been proved to be an essential quality for work. I construct the confidence variable by averaging each respondent's answers over the time. To avoid reverse causality, I exclude the answers in Wave IV.

Table 2.17 shows that this proxy for workplace personality has significant positive effect on earnings.

[2]http://www.forbes.com/sites/meghancasserly/2012/10/04/top-five-personality-traits-employers-hire-most/

Table 2.17: 2SLS Regressions of Log Hourly Wage Rate on Confidence Level and Attractiveness Measures.

Confidence	0.058*
	(0.025)
Physical Attractiveness/Attractive	0.187***
	(0.048)
Physical Attractiveness/Unattractive	-0.121*
	(0.052)
Personality Attractiveness/Attractive	-0.257*
	(0.125)
Personality Attractiveness/Unattractive	-0.081
	(0.114)
Grooming/Attractive	0.097
	(0.109)
Grooming/Unattractive	0.102
	(0.125)
Height (inches)	0.002
	(0.037)
BMI	-0.002
	(0.002)
N	6811

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.8 Conclusion

This paper studies the interrelationship among anthropometric measures, physical attractiveness, personality attractiveness, grooming and socioeconomic outcomes.

With all dimensions of attractiveness considered, I find that physical attractiveness still has significant effects on individuals' earnings and spouses' education. This finding is consistent with previous literature. I also provide some evidence of the existence of general employer discrimination against physically unattractive people.

There are two main limitations of this paper. First, height does not have significant effects on socioeconomic outcomes in the results of my analysis. This contradicts with many previous studies' results, so it might suggest potential problems with the data or the model. Second, the relationship between personality attractiveness and earnings is puzzling. This may be resulted from the unclear definition of personality attractiveness in the surveys of Add Health.

To the best of my knowledge, this paper is the first paper that studies the interrelationship among physical attractiveness, personality attractiveness and grooming, and how they affect socioeconomic outcomes together. More research is warranted.

3. LOVE OR MONEY? HOW MARRIAGE INCENTIVES AFFECT EDUCATION INVESTMENT DECISIONS

3.1 Introduction

Having a happy marriage is many people's dream, but different people define happiness differently. This paper understands that people who prefer marrying for money value current wealth and expected future earnings, while people who prefer marrying for love are more attracted to desirable attributes that are orthogonal to productivity and wealth level. Assuming both of these two types of marriage motivations exist in a population, I explore how young individuals behave when they make education decisions conditional on their differing motivations.

Education and marriage decisions are two of the most important decisions a person has to make. Many studies have established the fact that education has large effects on one's marriage outcomes. Becker (1973) shows that there is strong empirical evidence of a positive association between education of partners. Lefgren and McIntyre (2006) find that womens education is strongly related to husbands income and marital status. More specifically, college completion is associated with an increase in husbands earnings that exceeds $22,000. According to these empirical studies, it is not hard to find that, although the primary motivation for going to college is an increase in one's earnings power, college also provides a potential "marriage benefit" for college attendants. There are three main channels by which college attending singles obtain gains in the marriage market. First, attending college can increase marriage offer probabilities, since colleges provide social venues for young people to meet. Second, people with a college education have a higher likelihood of marrying partners with a higher education and thereby higher earnings, thus ben-

efiting from a higher household income overall. Third, one's education may have a positive causal effect on a partner's earnings, if her partner participates in the labor force. Lefgren and McIntyre (2006) provide evidence regarding the causal impact of education on marriage outcomes using a quarter of birth identication strategy. They suggest that, for women whose educational attainment was affected by quarter of birth, an extra year of schooling increases their husbands' earnings by over $4,000. Overall, Bruze (2009) suggests that better marital outcomes generate 35 percent of the return to education for women by the time they reach middle age.

However, most studies in this area take one's education decisions as given, and look for impacts of attending college on marriage outcomes. Fewer research effort have looked into the interrelationship between education and marriage in a reverse way. Even less empirical research is available on this subject. This gap is surprising, if individuals are indeed forward-looking, these conditions should be anticipated and may potentially modify pre-marital education decisions. The issues of ex ante investments have been studied in theoretical marriage models. Burdett and Coles (2001) examine equilibrium self-improvement and marriage proposal strategies in a two-sided search model. Booth et al. (2007) consider two separate matching paradigms for agents with heterogeneous abilities. On the empirical side, Ge (2011) constructs and estimates a dynamic model where women make schooling decisions jointly with marriage decisions. She finds that the predicted female college enrollment rate will drop from 58.0 percent to 50.5 percent if going to college has no gains in the marriage markets, which indicates that expected marriage outcomes have impacts on education investment decisions. This paper tries to fill this gap, and shed some light on how marriage prospect affects education choice.

More specifically, this paper only investigates the college decisions made by people who have less cognitive abilities than the average. Cognitive abilities are the brain-

based skills men need to carry out any task from the simplest to the most complex. Psychology shows that cognitive abilities affect mechanisms of how people learn, remember, and problem-solve rather than with any actual knowledge. Research has shown that cognitive abilities have effects on school achievements and work productivities. Christensen et al. (1975) found that ability is a strong and consistent influence on the probability of attending college. People with higher ability are more likely to receive more education and more likely to go to college. I discovered the same relationship in the Add Health data. In the lowest ability group, only 13.1 percent of students went to college eventually. As ability increases, the percentage of college attendance grows. In the highest ability group, there were over 63 percent of students who attended college. This fact is due to two reasons. One is that high ability students generally have better grades than their low ability cohort, and therefore have larger chances to be admitted by colleges. Figure 2 displays the relationship between ability and the average grade of students. The other reason is that high ability students have less effort cost when they study, take exams and apply to college. I define this effort cost as the amount of utilities one has to lose in order to be accepted by a college. With the same study environment, low ability students have to make more effort and incur larger effort costs. Since college is expensive already, this additional effort cost will prohibit students with low abilities from going to college. Therefore, this paper aims at understanding the role that marriage incentives play when low abilities students make college decisions. I argue that individuals make college decisions with future marriages on their mind. Since different marriage incentives will generate different marriage prospects, thus they will result in different education investment behaviors in early years.

The goals of this article are first to construct a theoretical model for two different types of people, and second to empirically estimate the behavioral differences between

these two types of people. I prove that, under a search framework, people with lower abilities are less likely to go to college than their high-ability cohorts. However, low-ability individuals who are marrying-for-money are more likely to go to college than their marrying-for-love cohort. (For simplicity, I will use shorter terms–love-type and money-type–to represent these two type of people.). To explain this explicitly, I simply compare the benefits and costs of going to college for different types of people. The benefits of attending college include high economic returns if they enter the job market and access to the "marriage benefit" discussed earlier. The costs of college education include tuition, fees and the "effort cost". However, for the money type of people, even if their abilities are lower than average, since they value current and future wealth much more than their love-type of cohort, they are more likely to go to college because their utility gains are still larger than costs they have to pay.

As mentioned previously, the second goal of this paper is to empirically estimate the behavioral differences between two types of individuals. The central challenge is the identification of the types, since they are unobservable. To solve this problem, I adopt the mixture density model that has been used in the literature to model unobserved heterogeneities by researchers, include Feinstein (1999); Keane and Wolpin (1997, 2001, 2010); Gan and Mosquera (2008), etc. A model with unobserved types have better performances and would lead to better out-of-sample predictions. What I find is consistent with the theoretical model predictions. In addition, I find that an individual's attitudes toward money, relationship and spiritual life are associated with his marriage incentive. Parental emotional supports also affect the formation of people's marriage incentives.

The remainder of this article proceeds as follows. The data I use is described in section 2 where some descriptive statistics are discussed. Section 3 gives some simple reduced-form evidence. I then propose a theoretical model in section 4 and present

the empirical model and estimation results in section 5. The last section concludes.

3.2 Data Description

I use data from the National Longitudinal Study of Adolescent Health (Add Health). It consists of four separate in-home interviews of a nationally representative sample of participants who were in grades 7-12 when the study originated. Add Health contains information on respondents social, economic, psychological and physical well-being. It also surveys respondents' family, school, peer groups, and romantic relationships. The data were collected beginning in 1994, with the first wave of the survey being conducted primarily during the 1994 - 1995 school year. The second wave followed up with respondents approximately one year later, during the summer of 1996. Wave III of the survey takes place in 2001 and 2002, and Wave IV took place in 2007 and 2008.

3.2.1 Factors in College Decision

The main characteristics I used in this empirical analysis are physical attractiveness, ability, family total income, parental characteristics and education. Table 3.1 presents the statistics describing these variables. I examine the individuals standardized Peabody Picture Vocabulary Test (PVT) score as a measure of cognitive ability. The test scores are standardized by age and grade. The minimum and maximum of the standardized PVT score in the sample is 9 and 141 respectively. Sandefura et al. (2006) found that parental education, family income, and social capital inside and outside the family all contribute to higher probabilities of attending college. Therefore, I include these variabels in my analysis. In the Add Health dataset, family wealth and mother's education are self-reported. I use the unemployment rate in the year when the respondent graduates from high school to capture the overall economic environment.

Table 3.1: Descriptive Statistics

	mean	sd
Sex	1.543	0.498
Standardized PVT score	99.935	14.731
College	0.333	0.471
Single Parent	0.273	0.446
Mother High School Grad	0.806	0.396
Mother College Grad	0.416	0.493
Poor Health	0.046	0.210
Family Total Income (thousand)	47.111	51.412
White	0.639	0.480
African American	0.222	0.415
Asian	0.072	0.259
Public School	0.926	0.69
Unemployment Rate	4.826	0.407
N	12759	

3.2.2 Factors in Marriage Incentives

The central empirical challenge of this analysis is the identification of the unobservable types. There is no literature on this subject. Intuitively, many factors may affect the formation of incentives to marriage, such as family background, closeness to parents, religion, etc. The Add Health data asks interviewees' feelings on a broad range of subjects. On relationships with parents, in Wave I each interviewee was asked whether her parents were warm and loving toward her (a five-point scale), whether she was satisfied with her relationship with her parents. On marriage/cohabitation attitudes, each interviewee was asked whether she agrees with the statement "It is all right for an unmarried couple to live together even if they aren't interested in considering marriage" (a five-point scale), how important it is to be married someday (a four-point scale). On religion and spirituality, each respondent states her present religion and was asked how important her spiritual life to her (a

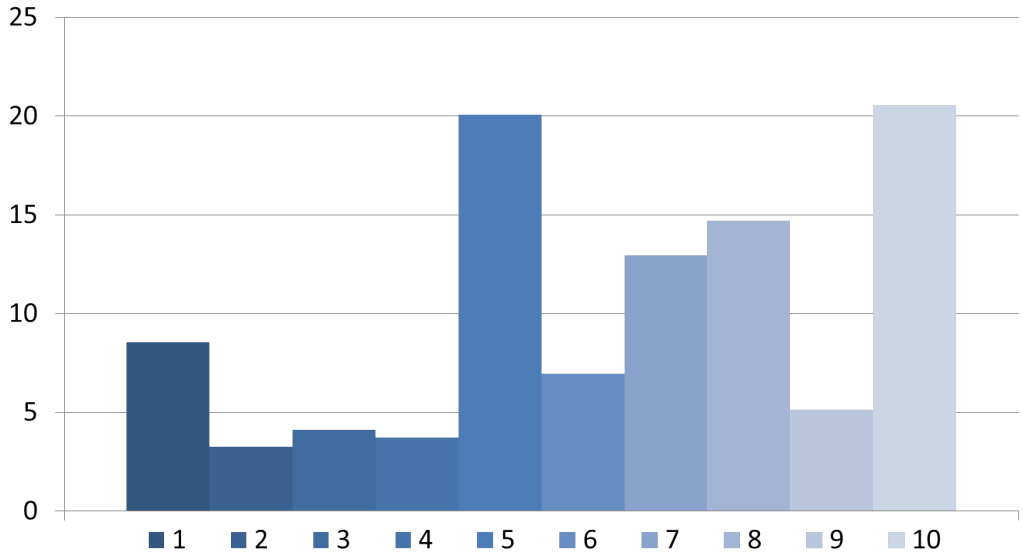

Figure 3.1: Responses of Ratings of the Importance of Having Enough Money for a Successful Marriage or Serious Committed Relationship

four-point scale). Particularly, in Wave III of the survey, respondents are asked to rate the importance of some elements for a successful marriage or serious committed relationship using a scale from 1 to 10, where 1 means not important at all and 10 means extremely important. The elements include being of the same race or ethnic group, love, being faithful, making a lifelong commitment and having enough money. Not surprisingly, 86.27 percent of respondents rate love 10; 88.81 percent rate being faithful 10; and 77.04 percent rate 10 on making a life-long commitment. Only 10.21 percent of people rate being of the same race or ethnic group as extremely important. In all of these elements, respondents hold similar attitudes; however, when it came to money, people's responses varied greatly. Figure 3.1 displays the overall rate of the importance of money in a relationship. Summary statistics of above variables are given in Table 3.2.

Table 3.2: Descriptive Statistics

	mean	sd
Mom Warm and Loving-W1	4.361	0.802
Dad-Warm and Loving-W1	4.125	0.928
Importance of Being of the Same Race or Ethnic Group-W3	3.784	3.211
Importance of Love-W3	9.657	1.152
Importance of Being Faithful-W3	9.719	1.074
Importance of Making a Lifelong Commitment-W3	9.292	1.674
Importance of Having Enough Money -W3	6.444	2.765
Okay to Live Together Without Marriage Commitment -W3	2.614	1.335
Important to Marry Someday-W3	1.709	0.856
Importance of Spiritual Life-W3	1.529	0.827
No Religion-W3	0.189	0.391
Christian-W3	0.319	0.466
Observations	12759	

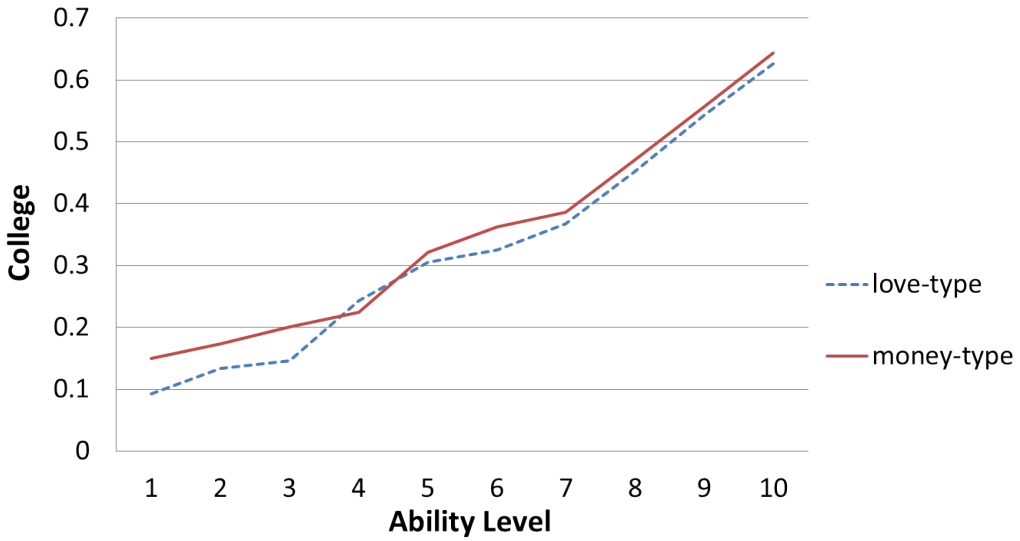

Figure 3.2: DID Intuition

3.3 Some Reduced-form Evidence

This section presents some patterns in the data that suggest people with different marriage incentives behave differently in college decisions. Since I cannot observe each person's marriage incentive directly, in this section, I use interviewees' responses to the money rating question to approximate their incentives. That is, I group interviewees who rate the importance of money in a serious relationship from 6 to 10 as people who care about money (money-type), while interviewees who give ratings from 1 to 5 as people who think money is not as important in a relationship (love-type).

Figure 3.2 shows the average college rates of people with different abilities. In Figure 3.2, there is a clear increasing trend as abilities increases for both types of people. When ability is small, individuals who do not value money in relationships have higher percentages that go to college. As one can see, there is an obvious gap of college rates between two types of people. When physical attractiveness equals to 2, the gap is as big as 8.71 percent. As physical attractiveness increases, the differences decrease gradually. When it reaches 4, there are almost no differences between the two types of people. However, what interesting is when ability level is small, individuals who consider money important have higher percentages that go to college.

To capture these effects, I use a difference-in-difference model:

$$College_i = \beta_0 + \beta_1 Type_i + \beta_2 Low\ Ability_i + \beta_3 Type_i * Low\ Ability_i + X_i\gamma + u_i \quad (3.1)$$

where $College_i = 1$ if an individual obtains a bachelor degree, $Type_i = 1$ if individual i belongs to the money-type. I define $Lowability = 1$ when the individual's standardized PVT score is lower than 92 (that is the bottom 30.1 percent of the

sample).

Column (1) in Table 3.3 is the estimation results of a baseline model. As expected, parameters of ability is positive. Column (2) displays the results of the DID model. The parameter of variable *type* is neither large nor significant, which indicates that these two types of people do not vary much in college attendance rate overall. The parameters for $Type_i * Low\ Ability_i$ shows that, on average, low-ability money-type individuals have 7.81 percent higher college attendance rate than the low-ability love-type.

Table 3.3: Baseline Model & DID Model

	(1)	(2)	(3)
Low Ability	-0.144***	-0.189***	-0.213***
	(0.011)	(0.018)	(0.022)
Type		-0.020	-0.039***
		(0.010)	(0.011)
Type*Low Ability		0.069***	0.085***
		(0.022)	(0.025)
Mother's Education	0.039***	0.038***	0.038***
	(0.002)	(0.002)	(0.002)
Single Parent	-0.075***	-0.076***	-0.087***
	(0.010)	(0.010)	(0.012)
Female	0.083***	0.084***	0.104***
	(0.009)	(0.009)	(0.010)
School FE?	YES	YES	YES
Additional Controls?	YES	YES	YES
Adjusted R-squared	0.206	0.207	0.222
N	9456	9456	7711

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.4 Theoretical Framework

In this section, I followed Booth and Coles (2010) and adopt a two-stage searching model which is set in discrete time, with period discount factor β. In the first stage imen and women make education choices, i.e. going to college or not. This decision will determine their ability level in the second stage. In the second stage, all the individuals enter the marriage market. Given an arriaval of partners, individuals decide whether to form a match. If a match is formed, it lasts forever. If no match is formed, then an individual searches again. Only single agents search for marriage partners. For simplicity, it is assumed that if an agent rejects a marriage offer, then this offer is no longer available.

Each individual is endowed with an ability $a \in [0, \bar{a}]$. In the first stage, each person chooses an education level $e \in [0, \bar{e}]$. $\bar{e} < \infty$ describes a ceiling level of education. Education here is interpreted as post-compulsory, which is not the learning of basic literacy and numeracy skills. An individual with ability a, who invests in e education in the first stage, will have second stage productivity (ability level) $p = a + e$ in the workplace. Assume the cost of education is a fixed amount times education level plus a function of ability $c = c_0 e + g(a)$. Function $g(a)$ is a decreasing function, which captures the "effort cost" mentioned earlier. Low-ability individuals have higher costs to receive education than their high-ability cohorts.

In the second stage, everyone enters the marriage market looking for a spouse. To illustrate essentials, I analyse a highly stylised marriage market and consider the problems faced by a woman w finding a husband. Let s_w denote the utility while single. Throughout I assume the utility of being single is sufficiently small, so it is always preferred to be in a partnership. Let U_w denote the utility she would obtain once she get married. Marrying different men would yield different utilities. Given a

matched pair $(p, a; p', a')$, couples make joint labor supply decisions. The following is the model from Booth and Coles (2010). They assume a competitive labor market. If only one partner with productivity p participate the labor market, then the family income of this couple is p. If both of them work in the workplace, the family income would be $p + p' - x$. Here x can be interpreted as the opportunity cost that would occur if the second partner goes to work, for example, the cost of private childcare when both parents participate in the labor market. Since x is unknown at the time of the match, it is considered as a random draw from distribution G, where G is a continuous distribution and has a support $[0, \bar{x}]$. For simplicity, Booth and Coles (2010) assume G is independent of $(p, a; p', a')$. Therefore, their expected utility of getting married is

$$U(p, p', \omega) = \int_0^{\bar{x}} max[p, p', p + p' - x] dG(x) + \omega$$

where $max[p, p', p + p' - x]$ describes their optimal labor supply choice, ω is an idiosychratic match value.

Booth and Coles (2010) consider two polar cases of individuals' motivation in marriage. The first polar case assumes $\omega = 0$ in all matches, which means there are no idiosyncratic values in the match, and potential partners value only their expected family income. I refer this type of people as "marrying for money". The second case assumes ω has two possible values. In most matches, $\omega = 0$; but in some matches, $\omega = \omega^H$. Assuming ω^H is sufficiently large that once it occurs, individuals prefer this match than any other matches. A stable matching allocation implies individuals accept such marriage offers and then leave the marriage market. I refer ω^H as the "love effect". It can be interpreted in three ways: first, it can represent some desirable attributes of the potential spouse, for example, honesty, a good sense of humor, etc.;

second, it can be view as a good match quality, i.e. they are compatible with each other; third, ω^H can be seen as the mysterious chemistry between two people. I refer this type of people as "marrying for love".

Following a standard dynamic programming approach, I can convert the marital search problem to a sequence of single period decision. In each period, an agent needs to decide whether to accept a marriage proposal or not. If she does not accept the proposal, she will come back to the market and continue searching in the next period. Let attributes of women and men be x_w and x_m respectively. These attributes can be considered as bundles of numerical characteristics that the person carries. Let V_w denote a woman's maximum expected discounted lifetime when single. It follows that

$$V_w(x_w) = s_w + \beta[(1-\alpha_w)V_w + \alpha_w E_w max(V_w, \frac{U(x_w, x_m)}{1-\beta})] \tag{3.2}$$

where E_w is the expectation operater. The arrival rate α_w is the rate at which this woman receives offers. This sequence of decision exhibit the well-known "reservation wage" property according to the search theory. This means that there exists some "reservation utiliy" U_w such that a person is just indifferent between accepting a marriage proposal and receiving the utility of getting married and continuing to search in the next period.

The reservation utility is the unique solution to

$$R_w(x_w) = s_w + \frac{\alpha_w}{1-\beta}\int_{R_w(x_w)}^{H_w(x_w)} (U(x_w, x_m) - R_w(x_w))dF_m(x_m), \tag{3.3}$$

where $F_m(x_m)$ is the distribution of men's attributes, $H_w(x_w)$ is the highest x_m that is willing to marry woman w. A woman with an attribute x_w will accept the first offer received from a man with an attribute at least as great as $R_w(x_w)$. The argument is

symmetric and the reservation match of a man of attribute x_m is given by

$$R_m(x_m) = s_m + \frac{\alpha_m}{1-\beta}\int_{R_m(x_m)}^{H_m(x_m)}(U(x_w, x_m) - R_m(x_m))dG_w(x_w). \tag{3.4}$$

Given men and women's optimal strategies, $H_w(x_w) = max\{x_m|x_w \geq R_m(x_m)\}$ and $H_m(x_m) = max\{x_w|x_m \geq R_w(x_w)\}$. Area $[R_w(x_w), H_w(x_w)]$ is the acceptable area for a woman with attribute x_w, which means that all the men with attribute $x_m \in [R_w(x_w), H_w(x_w)]$ are acceptable to her.

3.4.1 Ability

In this section, I consider each person's attributes only contain his ability level, i.e. $x_m = a_m, x_w = a_w$. For simplicity, I drop the subscript. In addition, I standardize the utility of being single to be zero for all.

In the second stage, the value function for a marrying-for-money type of person in each period is

$$V = \alpha\{[F(H(a))-F(R(a))]\int_{R(a)}^{H(a)}\frac{U(a,a')}{1-\beta}dF(a')+[1-F(H(a))+F(R(a))]V\}+(1-\alpha)V$$

. The brace in this equation represents, with probability α, an individual meets a potential mate. As soon as they meet, this individual discovers the ability level of the potential mate. If the ability level is within the individuals acceptable area (with probability $F(H(a)) - F(R(a))$), then they will get married. If not, the individual will go back to the marriage market and search in the next period. The last part of this equation represents the case when the individual does not meet anyone during this period.

$$V = \int_{R(a)}^{H(a)}\frac{U(a,a')}{1-\beta}dF(a')$$

. Therefore,

$$\frac{\partial V}{\partial a} = \int_{R(a)}^{H(a)} \frac{\partial U(a,a')}{\partial a} dF(a') + U(a,H(a))f(H(a))\frac{\partial H(a)}{\partial a} - U(a,R(a))f(R(a))\frac{\partial R(a)}{\partial a}$$

For a marrying-for-love type of person,

$$V = \alpha[q\int_{\underline{a}'}^{\bar{a}'} \frac{U(a,a')}{1-\beta} dF(a') + (1-q)V] + (1-\alpha)V$$

The only difference between the money type value function and the love type value function is that, the acceptable area for the love type person is $[\underline{a}', \bar{a}']$. This is because by assuming large idiosyncratic match values, the matching process of the love type person implies simple random matching.

$$V = \int_{\underline{a}'}^{\bar{a}'} \frac{U(a,a')}{1-\beta} dF(a')$$

Therefore,

$$\frac{\partial V}{\partial a} = \int_{\underline{a}'}^{\bar{a}'} \frac{\partial U(a,a')}{\partial a} dF(a')$$

Proposition: When a is small,

$$\frac{\partial V^M}{\partial a} > \frac{\partial V^L}{\partial a} > 0.$$

This proposition states that, for low-ability individuals, increasing their abilities by going to college will increase their value. However, the increased magnitude is larger for the money-type of person than the love-type of people, which indicates that low-ability money-type of individuals are more likely to go to college than their love-type cohorts.

3.5 Empirical Models

Having established a framework where individual with different marriage incentives develops different premarital investment strategies, I now investigate empirically the link between marriage incentives and education investments.

3.5.1 Decision to Attend College

The college decision is modeled as following:

$$College = 1(\beta_0^{Type} + \beta_1^{Type} X + \epsilon \leq 0) \tag{3.5}$$

Let X be a vector of the observable characteristics of individuals that may affect probability of attending college. X may include one's ability level, physical attractiveness, mother's education, family total income, living in an urban area or not, etc. ϵ is the unobserved random variable, which is assumed to have a standard normal distribution. Empirically, $College = 1$ if a individual completes college (get a bachelor's degree).

In order to compare behaviors between two types of people, I specify the college decision as following: $\text{College}_{it} = \beta_{0t} + \beta_{1t} Low\ Ability_{it} + X_{it}\gamma + \epsilon_{it}$

Coefficients β_{1t} captures the average effect of having low ability on college decision. As suggested in the theoretical model, people with lower abilities are less likely to go to college; but low-ability individuals who are marrying-for-money are more likely to go to college than their love-type cohort. Therefore, the predicted signs of β_{1t} is negative. In addition, β_{1Love} should be smaller than β_{1Money}.

3.5.2 Type

I assume there are two types of people in the marriage market. In general it is not possible to observe the type. However, it may be possible to observe a set of

variables Z that are related to individuals' types.

$$Pr(Type = Money) = Pr(Z_i\gamma + \sigma \leq 0) \tag{3.6}$$

$$Pr(Type = Love) = 1 - Pr(Type = Money) \tag{3.7}$$

Z includes one's family background, relationship attitudes, etc. This model belongs to the family of the mixture density models which have been widely used in the literature to model unobserved types. The identification is based on the assumption of distribution. Here σ is assumed to follow the standard normal distribution.

3.5.3 Estimation

In this setup, the probability of going to college depends on the type of each individual: money-type and love-type. Let $Type$ be a random variable with a Bernoulli distribution such that $Pr(Type = Money) = p$ and $Pr(Type = Love) = 1 - p$. When $Type = Money$, the conditional probability of going to college is given by

$$Pr(College = 1|Type = Money) = Pr(\beta_0^M + \beta_1^M X + \epsilon \leq 0) \tag{3.8}$$

Therefore,

$$Pr(College = 1) = pF(\beta_0^M + \beta_1^M X) + (1-p)F(\beta_0^M + \beta_1^M X) \tag{3.9}$$

Since all the error terms are assumed to have normal distribution, the likelihood function of the model is:

L $= \sum_{i=1}^{n} College_i ln[\Phi(Z_i\gamma)\Phi(\beta_0^M + \beta_1^M X) + (1 - \Phi(Z_i\gamma))\Phi(\beta_0^L + \beta_1^L X)]$
$+ (1 - College_i) ln[1 - \Phi(Z_i\gamma)\Phi(\beta_0^M + \beta_1^M X) - (1 - \Phi(Z_i\gamma))\Phi(\beta_0^L + \beta_1^L X)]$

3.6 Results

3.6.1 Estimation Results

Estimation results are reported in Table 3.4 and Table 3.5. The upper and lower panel in Table 3.4 show the estimates for college decision of the love-type and money-type respectfully. All the coefficients are of the desirable sign.

Table 3.4: Estimation Results of the Two-Type Model

	(1)	(2)
Love Type		
Lowability	-1.173*	-1.29***
	(0.546)	(0.320)
Mother's Education	0.812***	0.168***
	(0.13)	(0.051)
Family Total Income (thousand)	0.014***	-0.003
	(0.003)	(0.002)
Sex	0.465**	0.486***
	(0.160)	(0.193)
Money Type		
Lowability	-0.875***	-0.945***
	(0.119)	(0.246)
Mother's Education	0.135***	0.272***
	(0.018)	(0.064)
Family Total Income (thousand)	0.0008	0.011***
	(0.0008)	(0.002)
Sex	0.310***	0.428***
	(0.079)	(0.084)
N	6812	5464

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.5 reports the type determination results. Except the importance of being of the same race or ethnic group for a successful marriage, all the coefficients for

Table 3.5: Estimation Results of Type Identification

	Type = Love	
Importance of Having Enough Money	-0.135**	(-3.13)
Importance of Love	0.149*	(2.06)
Importance of Being of the Same Race or Ethnic Group	0.0476	(1.85)
Important to Marry Someday	0.710***	(4.10)
Importance of Spiritual Life	0.247**	(2.67)
Okay to Live Together Without Marriage Commitment	-0.252***	(-3.40)
Dad Warm and Loving	0.381***	(3.49)
Constant	-4.612***	(-4.31)
N	5526	

standard error in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

other variables are significant. The results suggest that people who think having enough money is important for a successful marriage are more likely to be the type of marrying for money; people who think love is important are more likely to marry for love. If a person considers marrying someday important, or if he considers spiritual life important, he is more likely to be a love-type. The more someone agrees with the statement, "It is all right for an unmarried couple to live together even if they aren't interested in considering marriage," the more likely he is to be a marrying-for-money type of person. If one's father was loving and warming when he was young, he is more likely to be a marrying-for-love type of person.

3.6.2 Descriptive Comparisons

Based on the estimation results of type identification, I present several descriptive comparisons between the two type of people. Among the 5,526 respondents (sample size for the estimation of the mixture density model), 62.79 percent belong to the marrying-for-money type and 37.21 percent belong to the marrying-for-love type. This composition does not vary much among different race groups (White: 61.55

percent, 38.45 percent respectively; African American: 62.42 percent, 37.58 percent respectively; Asian: 70.50 percent, 29.50 percent respectively). For the money-type of people, 26.60 percent went to college, while 47.20 percent of the love-type went to college. By Wave IV of the survey (2008), the sample was aged 25-34, and 52.21 percent have got married. I define people who get married before 25 as marrying early, then 15.85 percent of the money-type of people and 25.57 percent of the love-type of people married early.

In Wave IV, the survey asked married respondents about their feelings of their marriages. Each respondent rated how much he loved his spouse (a four-point scale), in general how happy he is in his relationship with his spouse (a three-point scale) and how committed he is to his relationship with his spouse (a four-point scale). For the money-type of people, 79.24 percent of respondents claimed to love their spouses a lot, 66.31 percent were very happy to be with their spouses and 63.68 percent claimed to be completely committed to their partners. For the love-type of individuals, 87.29 percent of respondents said they loved their spouses a lot, 77.61 percent were very happy to be with their spouses and 75.71 percent claimed to be completely committed to their partners. These two sets of statistics corroborate that people with different marriage incentives have different marriage utilities. It also suggests that there exists a trade-off relationship between "love" and money in marriage. Results are presented in Table 3.6.

3.7 Conclusion

This paper first presented a theoretical model to understand people's searching behavior in the marriage market. Under two different motivations ("marrying for money" and "marrying for love"), individuals have different marriage prospects and thus develop distinct education investment strategies. A low-ability marrying-for-

Table 3.6: Descriptive Comparisons

	money-type	love-type
Full Sample	62.79%	37.21%
Female	58.50%	41.50 %
Male	67.21%	32.79%
White	61.55 %	38.45%
African American	62.42 %	37.58%
Asian	70.50 %	29.50%
Early Married	15.85%	25.57%
How much do you love your spouse?	79.24%	87.29%
How happy are you in your relationship with your spouse?	66.31%	77.61%
How committed are you to your relationship with your spouse?	63.68%	75.71%
N	5526	

money type of person is more likely to go to college than his marrying-for-love cohort. Empirical support for these conclusions was found in the data. Using the mixture density model, the estimation results give strong evidences of the existence of two types of people. An individual's attitudes toward money, relationship and spiritual life are associated with his marriage incentive. Parental emotional supports also affect the formation of people's marriage incentives.

These results provide interesting insights into the determinants of educational decisions. When individuals are making educational decisions, labor market prospects are not the only element taken into account. People are forward-looking, and therefore form expectations of the "marriage benefit" of college and develop investment strategies according to their marriage incentives. Assuming different incentives allows individuals to have different forms of utilities, which makes the economic theory more adaptable and closer to the reality.

The results of this paper also suggest that a careful analysis of how marriage incentives may affect the process of pre-marital decisions as well as post-marital outcomes would enhance our understanding of the household, for example, labor participation. While there is a large body of literature studying females work decisions, little is known about how marriage incentives jointly affect women's pre-marital education decisions and post-marital work decisions. For instance, a low-ability marrying-for-money type of woman may choose to go to college in order to marry someone who has large earnings power, and then decide to stay at home after getting married because she may not be competitive in the job market. If we ignore the whole behavior strategy, we would probably attribute the woman's work decision to her husband's earnings power and miss the real point. More research is warranted.

4. SUMMARIES

Attractiveness, especially physical attractiveness, has always been an intriguing subject in economics research. Studies have shown that people who are more physically attractive generally do better in education, labor market and marriage market. However, the meaning of physical attraciveness itself has not been fully explored in the research. High physical attractiveness could mean either a fit body, a desirable height or a good looking face. Due to the measurement error in surveys, physical attractiveness may also be affected by respondents' grooming levels and personalities. If researchers do not take all these factors into consideration, they cannot fully understand how physical attractiveness affects one's socioeconomic outcomes. In Section 2 of this dissertation, I use a data called Add Health to study this problem. Add Health asked interviewers to measure each responden's height and weight. It also asked interviewers to rate each respondent's physical attractiveness, grooming level and personality attractiveness. I showed that with all dimensions of attractiveness considered, physical attractiveness still has significant effects on individuals' earnings and spouses' education. I also provide some evidence of the existence of general employer discrimination against physically unattractive people. Personality attractiveness does not have significant impact on individuals' earnings. One possible explanation is that personalities rated by interviewers in the Add Health surveys are different with personalities that companies would assess in the hiring processes. Therefore, I construct a proxy for workplace personality. The result shows that this proxy has ignificant positive effect on earnings.

After invesgating how attractiveness affects both labor market and marriage market. I then look at the interrelationship between labor market and marriage market.

Education and marriage decisions are two of the most important decisions a per- son has to make. Many studies have established the fact that education has large effects on ones marriage outcomes. However, most studies in this area take ones education decisions as given, and look for impacts of attending college on marriage outcomes. Few research effort have studied how marriage prospects would impact one's education investment decision. In Section 3, I investigate pre-marital education investment strategies developed by individuals with different marriage incentives. Results show that people with lower abilities are less likely to go to college than their high-ability cohorts. Low-ability individuals who value current wealth and expected future earnings in a relationship ("marrying-for-money" type) are more likely to go to college than their cohorts who prefer desirable attributes or matching qualities ("marrying-for-love" type) in their future marriages.

In sum, this dissertation studies the interrelationship among attractiveness, labor market and marriage market outcomes. There are some limitations of this disseration. First, in the study of the relationship between attractiveness and socioeconomic outcomes, height does not have significant effects on socioeconomic outcomes in the results of my analysis, which contradicts with many previous studies' results. Second, in Section 3, besides the "marrying-for-money" type and the "marrying-for-love" type, a neutral type may be introduced in the model and may change the results. More research is warranted.

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