# ECONOMICS OF GAP YEAR STUDENTS

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

by

Mirinda Lee Martin

August 2016

# ECONOMICS OF GAP YEAR STUDENTS

Mirinda Lee Martin, Ph. D.

Cornell University 2016

As high school graduates seek postsecondary education, they must decide when to enroll and what type of institution to attend. Students that delay enrollment in college, known as gap year students, have been shown to suffer a penalty. This dissertation contains essays focused on the labor market and academic outcomes of gap year students and uses data from the National Longitudinal Survey of Youth 1997. The first essay estimates the effect of enrolling in different types of institutions on the labor market and academic outcomes of delayed and direct enrollment. This paper uses ordinary least squares linear regression initially, then average treatment on the treated effects with nearest neighbor matching in order to control for selection. These models estimate the effects for enrolling in the different types of postsecondary institutions as compared to never enrolling in college or enrolling in a public four-year institution for both delayed enrollment and direct-to-college students. These models confirmed that gap year students generally have lower earnings and lower progress toward and completion of associate and bachelor's degrees than direct-to-college students. However, gap year students do have higher earnings than those high school graduates that never enroll in college. The type of institution generally mattered very little for labor market and academic outcomes with a few exceptions. Gap year students at the private two-year institutions generally had worse labor market

outcomes and lower academic achievement, even after controlling for selection. The second essay divides students into two types of gap year students, the majority of whom struggle academically or financially and likely delayed enrollment for that reason. The negative results found in the first essay come from these gap year students. However, there exists a small minority of gap year students that likely delayed enrollment for personal enrichment reasons, called type 2 gap year students. A regime switching model is used to split the students and the type 2 gap year students are found to suffer no penalty from delayed enrollment. Specifically, at the end of six years, the type 2 gap year have caught up with the direct enrollment students in terms of earnings

## BIOGRAPHICAL SKETCH

Mirinda Martin, known to friends and family as Mindi, has always loved teaching. She began tutoring other students as early as junior high school. She attended Brigham Young University as a Gordon B. Hinckley Presidential Scholar and a National Merit Scholar. She began her college career with an undergraduate major in Physics because she loved learning why things did what they did. She took an introductory economics class as part of her general education coursework and fell in love. She eventually added a double major in Economics because she loved learning why people did what they did. During her time as an undergraduate, she paused her studies for 18 months to serve a mission for the Church of Jesus Christ of Latter-day Saints in the Ventura, California area among the Spanish speaking immigrants, where she volunteered service and taught them English and gospel principles. After her mission, she completed her double major in Applied Physics and Economics. Mindi's next adventure in life was to move to Ithaca, NY to earn a doctorate degree in Economics at Cornell University. She had many examples of great teaching while there: David Easley, Tapan Mitra, Ron Ehrenberg, George Jakubson, Mike Lovenheim, Jordan Matsudaira, and many others. After several years at Cornell, Mindi once again realized that her passion in life was teaching and sought opportunities to teach students. She worked as a teaching assistant for Steven Kyle in a Principles of Macroeconomics class at Cornell University as well as a teaching assistant for Ron Ehrenberg and George Jakubson in Labor Economics. During her last year at Cornell, she worked as an adjunct professor teaching Principles of Microeconomics and Macroeconomics at nearby postsecondary institutions, Ithaca College and State University of New York-Cortland. During her final semester, she taught her own course in Labor Economics at Cornell University. When she only had her dissertation left to complete, she found a job in the Economics Department at

Brigham Young University—Idaho. Mindi is grateful to work with wonderful students and colleagues at BYU-Idaho. While balancing an exciting new job and life in Rexburg, Idaho, Mindi completed her dissertation, the result which is found here. She also got engaged to Lipeng Yuan, PhD, who she met while he was doing a postdoc in Engineering at Cornell University. They will be married next year.

*Dedicated to James and Rhonda Martin, my parents, and to Lipeng Yuan, my love,*

*Finally, this is dedicated to my Heavenly Father in gratitude for his lifelong support.*

ACKNOWLEDGMENTS

I would like to thank my dissertation advisor and mentor, Ron Ehrenberg, for his support and guidance as I pursued my doctorate degree. He has been an example to me as a good man and a good economist and researcher. I learned a lot from him about research and the economics of education, but also about life. I appreciate the support and encouragement that he gave me in my decision to pursue a more teaching focused career. During my doctoral education, I was challenged and grew tremendously and Ron guided me through much of that experience.

I would also like to thank George Jakubson for his role as advisor and mentor. In addition to being a great teacher, he spent hours in his office with me discussing econometrics and poring over data tables, code, and the background behind various econometric techniques. I enjoyed the opportunity to observe him in the classroom in both my own classes and as a teaching assistant. There are several phrases and lessons that I learned about teaching and econometrics that will stick with me for years to come.

I am grateful for my other advisor, David Just, for his support and encouragement. In addition to his expert advice on food and nutrition in the public schools, he also gave me the words and encouragement that I needed to hear on several occasions during my last years of my graduate education.

There are several other individuals and groups that I would also like to acknowledge. I am grateful for the help from many of the assistants on campus, particularly Darrie O'Connell who was amazing and always a huge help. I had several excellent examples of teachers while at Cornell, most notably David Easley, Tapan Mitra, Ron Ehrenberg, and George Jakubson. I learned a lot about teaching from observing their differing teaching styles and use many of the lessons and techniques that I learned in my own teaching. I am grateful for all of the friends that I made in

the Economics department, but I particularly appreciate the support of Freeha Fatima and Nolan Kopkin. I enjoyed the dinners, the late nights studying, and discussing research ideas. Their friendship was a continual support to me during the long years of graduate school. We formed a bond that first year of grad school that has lasted.

I want to thank my parents, Jim and Rhonda Martin, for their support and encouragement and for teaching me to finish what I start and to eat the elephant one bite at a time. My mom sometimes worried that she was calling way too often, but her love and support was always appreciated. I could not have done this without them. Thank you as well to my other family members who offered me advice as they could, but mostly shared their support and confidence in my ability to do well. It was nice to have a brother and a brother-in-law that were going through similar experiences at the same time. Thank you to James and Savili Martin and Tricia and Ryan Schuetzler. Also, thank you for having cute kids that always brightened my life when I got to see them. I want to thank my fiancé Lipeng Yuan for his confidence, love, and support, even if much of it was long distance. It probably helped me to work harder since he was not around to distract me. Most of all, I am grateful to my Father in Heaven for his love and support. He has helped me through many difficult things as well as encouraging me along this path and I know that I could not have done this without him.

I want to thank those that gave me opportunities to teach during my time in graduate school. I enjoyed tutoring several students at Cornell, many in multiple classes. I am grateful to Michael Ransom for giving me the opportunity to teach at Brigham Young University during the summer after my third year of graduate school since this helped solidify my desire to continue my doctorate degree. I am also grateful for the mentoring received from Mark Showalter during my summer teaching there. I am grateful for the chances to teach that I received to teach at nearby Ithaca

College and SUNY-Cortland. I am especially grateful that Kevin Hallock offered me the opportunity to teach a section of Labor Economics at Cornell University my final semester. I loved it and I think that it helped me get my dream job. I am grateful that the Department of Economics at Brigham Young University Idaho took a chance on a fresh graduate and let me join their awesome department. I have a lot of fun with the students and faculty there.

Finally, I would like to thank my cheerleaders in Idaho: Tricia Cox, Amy Staiger, Denise Rydalch, and Eva Sommers. My friends and colleagues in the Economics department have helped me become a better teacher as well as encouraged and supported me. Thank you as well to my teaching assistants, research assistants, Economics Society presidents, and favorite Economics students at BYU-Idaho these past few years. They are why I love my job and what motivated me to finish.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

**Chapter 1: Institutional Choice: Catering to Students' Needs**



**Chapter 2: The Gap Year Experience: Differentiating between Types of Gap Year Students**

**Appendix A**

# PREFACE

A growing number of college students are non-traditional students who delay enrollment into college instead of attending college the semester following high school graduation, and are commonly referred to as gap year students. These students have been shown to be at a disadvantage as compared to the direct-to-college students in terms of their academic outcomes. This dissertation seeks to understand the key determinants of delayed enrollment, and focuses on the labor market and academic outcomes of gap year students in various institutional contexts.

This dissertation consists of two essays. The first essay compares the outcomes of gap year students by the type of institution attended. Here we want to study whether one type of institution better serves gap year students as compared to other types of educational institutions. In addition, the essay compares the outcomes of gap year students to direct-to-college students, and high school graduates that are never observed to enroll in college. Note that college students are able to enroll in one of the following types of postsecondary institutions: (i) public two-year institutions, (ii) private not-for-profit or private for-profit two-year institutions (grouped because of the similarities between them and the small number of institutions in the aggregate), (iii) public four-year institutions, (iv) private not-for-profit four-year institutions, and (v) private for-profit four-year institutions. This essay utilizes the confidential Geocode data from the National Longitudinal Survey of Youth 1997 (NLSY97) in order to use information on the specific college that the student attended as well as the state and county that the student is from. For example, an important factor in the choice of college for many students is the variety of different types of colleges available to students in their home region. Thus, it is important to control for the share of each institution type in a student's home region as part of controlling for selection.

Initially, this essay uses ordinary least squares to estimate the effect of different types of institutions on labor market and academic outcomes of gap year students. However, to adequately control for selection, a propensity score is estimated using a multinomial logit model for each high school graduate and nearest neighbor matching is used to estimate the average treatment on the treated (ATT) effects. Both estimation models confirm that gap year students do suffer a penalty for delayed enrollment as compared to direct-to-college students. I also find that no particular institution type has a consistently positive effect on the outcomes of gap year students. All institution types perform similar to a public four-year institution for gap year students, with the exception of private for-profit and private not-for-profit two-year institutions. Even after controlling for selection, students enrolling in these institutions generally have worse log earnings and lower progress toward and completion of associate and bachelor's degrees.

The second essay considers a different approach with gap year students. Though studies in the United States show that taking time off after high school graduation before attending college leads to worse labor market and academic outcomes on average, this may not be true for all gap year students. There is a growing trend in the US to take a gap year before starting college for personal enrichment reasons. The second essay therefore seeks to differentiate between two types of gap year students; type 1 students and type 2 students. Type 1 students are those who delay enrollment due to financial constraints, poor performance in high school, or family reasons like getting married or having a child. The type 2 gap year students are those who delay college enrollment for personal enrichment reasons. I use the characteristics of students that directly enroll in college and those of high school graduates never observed enrolling in college to create weights for how

important a particular characteristic is in the probability that a gap year student is a type 2 student. A regime switching model is used to determine the best threshold to use on the calculated probabilities to split up the two groups. Comparisons and tests on the different groups confirm that they are actually different groups and it is appropriate to split them up. The majority of gap year students are found to be type 1 gap year students and have lower earnings compared to direct-to-college students, the penalty normally associated with delayed college enrollment in the US. However, the type 2 gap year students have earnings that are statistically similar to direct-to-college students and suffer no penalty for delaying college enrollment.

An important distinction about the models used in the two essays is that they are based on two different underlying assumptions about the unobservable characteristics of the students. The first model uses a propensity score with nearest neighbor matching in order to group similar students together and compare their average outcomes with each other. It assumes that if the students are found to be similar on all of the characteristics that we can observe about them, they must be similar in the characteristics that we do not observe. This leads to the conclusion that the differences in their outcomes must be coming only from the different "treatments" that they receive, or rather the different choices that they make. The second model uses maximum likelihood estimation as part of the regime switching model, and has the underlying assumption that if observationally similar students are making different choices, there must be something very different about the characteristics that we do not observe that causes them to make different choices. Since it uses non-linear modeling and maximum likelihood estimation this makes it a more difficult model to estimate. Though I believe that the assumption that makes more sense is the one found in the second essay, I think that it is not as widely used because it generally

requires more data, more computing power, and a large enough difference in order to provide statistically significant results. However, the model used in the first essay is generally regarded as a fairly good substitute model when pure randomization cannot be found or used.

# CHAPTER 1

## INSTITUTIONAL CHOICES: CATERING TO STUDENTS' NEEDS

### *Introduction*

In his 2009 State of the Union address, President Barack Obama spoke to Congress about the need for more Americans to receive higher education or career training in the United States:

> So tonight I ask every American to commit to at least one year or more of higher education or career training. This can be a community college or a four-year school, vocational training or an apprenticeship. But whatever the training may be, every American will need to get more than a high school diploma… we will provide the support necessary for all young Americans to complete college and meet a new goal: By 2020, America will once again have the highest proportion of college graduates in the world. (*State of the Union Address*, 2009)

In achieving this goal, it is important to consider more than just the traditional student. Of students that are enrolling in college, a growing number are non-traditional students who delayed enrollment instead of attending the semester following high school graduation – these students can be referred to as "gap year students." In the 1999-2000 school year, 37% of college students had delayed at least one year before enrolling (National Center of Education Statistics (NCES), 2005).

Students choose to delay college for multiple reasons, many relating to their transition into adulthood, such as work, marriage, or parenthood. They may choose to enter the workforce before enrolling in college because they tired of school or were poorly prepared academically. They may seek to earn money to finance future college tuition or to provide for their families. They may serve in the military, travel abroad,

or participate in a service opportunity like AmeriCorps. Gap year students may also include adult learners who desire more skills or certification to advance in the workplace, or other displaced workers seeking retraining or further human capital.

Research performed in the United States has consistently shown negative results for the students who delay enrollment. The first study by Featherman and Carter (1976) showed that delayed enrollment students completed less years of schooling and entered less prestigious jobs. However, when controlling for occupation, they found no earnings difference between normal and delayed enrollment. Most studies since that time have focused on factors explaining delayed enrollment or on degree completion. These have found that students are likely delaying enrollment because of poor academic preparation and financial constraints, as well as marriage or childbearing before college enrollment. Even when studies have controlled for these events and characteristics, researchers have still found a negative effect on degree completion for gap year students. Though degree completion is highly correlated with earnings, no other studies since Featherman have focused on labor market outcomes.

Currently, a variety of institutions compose the higher education system in the United States due to the country's fairly free market for postsecondary education – this allows for program innovation and participation by non-public entities, both non-profit and for-profit[1]. As a result of the freedom allowed, the institutions in the U.S. vary in terms of selectivity and quality, as well as type. The majority of postsecondary institutions fall into one of six categories, described by the typical length of time spent to attain a degree, four-year or two-year and less, and the sector providing the education, public, private not-for-profit, and private for-profit institutions.

Four-year public and private not-for-profit institutions are the most traditional

[1] Hoxby 2012.

way to educate a large number of students. These institutions vary widely in terms of selectivity of admitting students; some universities are very selective and others, usually public universities, have only some or no selection. Two-year public institutions, such as community colleges, are only seen as a "junior college" or gateway to postsecondary schooling by many potential students. These often have lower operating costs, charge cheaper tuition, and are less selective and more flexible in absorbing more students. Private for-profit institutions generally have greater flexibility than other types of higher education institutions; they are more able to enter and exit local markets and specific degree areas. Additionally, these tend to offer more flexible class schedules and degree options for students.

Two-year institutions, public or private, for-profit, are the options that most non-traditional types of students turn to when choosing postsecondary education later in life. Most for-profit institutions and two-year institutions lack the selectivity requirements that many four-year universities have; this could explain some of the appeal these institutions have to non-traditional students. For those students enrolling in college for the first time in the 1999-2000 school year, over 67% of students who delayed enrollment by one year or more attended a two-year public or for-profit institution as compared to only 39% of those students who did not delay college enrollment[2]. Only 29% of gap year students enrolled first in a four-year institution as compared to 55% of traditional students who did not delay enrollment (NCES, 2005).

Recently, for-profit institutions have faced a flurry of media attention with the release of a study done by the United States Government Accountability Office. This study revealed that several of the specific for-profit institutions investigated were utilizing aggressive recruiting techniques and a few even encouraged fraudulent

[2] NCES 2005 report. Additionally, the data used in this essay also shows similar statistics of 65% of gap year students enrolling in a two-year public or for-profit institution versus 33% of students who directly enroll in college after high school graduation.

practices (USGAO, 2010). This created a general concern that these institutions were taking advantage of students and government money through federally funded grants and loans. This report resulted in new legislation for the regulation of for-profit postsecondary institutions.

As a result, most studies looking at private for-profit institutions focus on the value for the money spent; however, valuing these institutions can be difficult. As mentioned, some of these institutions use vigorous recruitment practices to entice students to enter and apply for federal financial aid to finance their education. Some statistics suggest that these institutions may not actually prepare their students properly for the labor market by increasing the probability of employment or delivering the expected earnings. For example, the two-year and three-year default rates on federal student loans at private for-profit institutions is much higher than for community colleges or private not-for-profit institutions.[3]

While private for-profit institutions tend to be under heavy criticism, these institutions claim to be an important part of the higher education system because of their open enrollment policies and ability to cater to non-traditional sectors of students. They claim to provide access to higher education for students who would have a more difficult time receiving it elsewhere; a study showed that students who were military veterans strongly preferred for-profit institutions because of their open enrollment and flexibility.[4] Because of these characteristics, these institutions may be the best to serve gap year students.

This essay examines the academic and labor market returns for non-traditional students who delay entering postsecondary education for a year or more, otherwise known as "gap year students." It looks at the outcomes for each choice of institutional

[3] See Deming, Goldin, and Katz (2011).
[4] See Steele, Salcedo, and Coley (2011).

type available to them when they first choose to enroll in postsecondary education. The National Longitudinal Survey of Youth from 1997 is used to examine the effects of choice of institution on outcomes for gap year students as well as high school graduates who are not observed enrolling in college and compares them to students who immediately enroll in college. First, OLS regressions are used to get preliminary estimates and find that gap year students generally have worse outcomes in weekly earnings and in progress toward and completion of associate and bachelor's degrees. These models find few differences in the outcomes based on initial choice of institutional type. Second, nearest neighbor propensity score matching with replacement is used in order to control for students' self-selection into timing of college enrollment, as well as their choice of postsecondary institution type. Looking at the results of the average treatment effect on the treated, there are similar effects on academic outcomes for both the gap year students and the students enrolling directly in college, though the strength of the effects differs by institutional type. However, labor market outcomes show different effects for the two types of students based on type of institution: gap year students are best served by attending a public four-year university or possibly a private for-profit four-year university, while it appears to make no difference for direct-to-college students when controlling for selection.

The rest of this essay is organized as follows: the next section reviews the literature on gap year students and returns to education by institutional type, the third section provides background information on the structure of the postsecondary education system in the United States, the fourth section provides the conceptual framework and details the estimation strategies used, the fifth section describes the data gathered and constructed, Section VI discusses the results, and the last section concludes.

***Background***

Much of the initial research examining gap year students has included the influence of observable background characteristics on the likelihood of students to delay enrollment. The first study to look at the effect of delayed college enrollment was conducted by Featherman and Carter (1976) using a sample of 340 men from Michigan from the 1939-1940 birth cohort[5]. They found that those who delayed entry into college by at least six months completed less years of schooling than those who entered directly. Additionally, they found that even when they compared those with the same educational attainment, those who entered college directly generally had a more prestigious fulltime position as compared to those who delayed entry or had discontinuous patterns of college attendance. However, these earnings differences were not significant when they compared results within an occupation. Interestingly, they also found that standard socio-demographic characteristics, such as father's occupation and education, mother's education, location in an urban area, and cognitive ability, were unrelated to delaying entry into post-secondary education.

Since that time, however, several studies by sociologists have indicated that this is no longer the case; these have found that several socio-demographic characteristics that indicate poor financial and academic preparation for college are also indicative of the likelihood to delay enrollment in higher education. For instance, James Hearn (1992) looked at high school seniors in the United States from the class of 1982 in order to analyze how socioeconomic status and other factors affected the timing of college enrollment. He found that those students who delay college enrollment by a year or more after high school graduation are more likely to be male, come from a low socioeconomic background, and perform poorly on schoolwork and standardized tests. His conclusion was that students delaying college enrollment were

[5] Typical high school graduation in 1957 or 1958.

likely doing so because of poor academic preparation or financial restraints. This conclusion is supported by an educational psychology study done with high school and college students in Australia performed by Andrew Martin (2010). He found that students who had more uncertainty about their plans after high school were more likely to plan on a gap year before college and that poor academic preparation led to much greater uncertainty. An update to Hearn's study was published in 2007 by Heather T. Rowan-Kenyon, who found that socioeconomic status continues to play a large role in predicting delayed enrollment, though academic preparation and background characteristics still factor in as well.

Most sociologists have focused specifically on the effect of delayed enrollment on overall college completion. Jacobs and King (2002) used a dataset comprised entirely of women from ages 15-44 and found that women who enrolled in college later in life were much less likely to receive a bachelor's degree than those who enrolled in their early twenties; this difference was attributed mostly to other demands on their time, like responsibility for children or a job. Bozick and Deluca (2005) used the National Educational Longitudinal Survey of 1988 (NELS88) in order to isolate this effect on college completion after controlling for background characteristics, and still found that gap year students are 67% less likely to complete a college degree. To remove the effect of the type of institution attended, they also focused on just those students that attended a four year university and still found negative returns on degree completion from delaying college enrollment. They also introduced the idea that different life events, such as marriage or childbearing, may have a significant influence on college enrollment and completion; they found a negative effect on degree completion when students married or had a child before or during postsecondary education. However, they found no change in the negative effect of delaying enrollment in college when they controlled for having a child.

In order to analyze the effect of life events and the socioeconomic status of students, Goldrick-Rab and Han (2011) also used NELS88. Their study focused on explaining the gap in enrollment delay between socioeconomic status (SES) groups. They compared the top 20% SES group to the bottom 20% SES group, and found that students from the bottom 20% are six times more likely to delay college enrollment. However, once they take into account the differences in academic preparation and early family formation, the gap changes to only two times as likely to delay enrollment. From the paper by Bozick and Deluca, they already knew that delaying college exerts an independent effect on college completion net of family formation, but they also found that family formation is independently associated with the likelihood of delay, thus contributing to the class gap in delayed enrollment. They also found the effect of family formation varies between SES groups; having a child before enrolling in college affects the enrollment timing of the top 20% SES group much more than it affects the bottom 20% SES group, though students from the bottom group are much more likely to have a child before enrolling in college.

In addition to controlling for marriage and parenthood when analyzing delay in college enrollment and degree completion, Roksa and Velez (2012) argued that it is important to control for the timing of all of the transitions to adulthood, including the transition to employment. They used the National Longitudinal Survey of Youth of 1997 to create monthly time-varying measures of employment, marriage, and parenthood. Though they found that these transitions into adulthood are much more prevalent among students who delay enrolling in college, they also found that these alone do not provide a full explanation of the negative relationship between delayed enrollment and degree completion. Instead, they conclude that the challenge of combining higher education with other roles as an employee, parent, or spouse makes it difficult to balance all other responsibilities. A higher proportion of students who

delay entry have this struggle in balancing responsibilities throughout their postsecondary schooling, which leads to a lower likelihood of degree completion.

As mentioned above, most research on gap year students has focused on student characteristics and discovering the reasons for delaying college enrollment. Current literature lacks research focused on academic and labor market outcomes for gap year students by institution type attended. However, there have been several studies focused on the returns to college by institutional type alone, with a focus on two-year institutions and most recently on for-profit institutions.

Most of the recent research focusing directly on two-year institutions deals with students who transfer from a two-year institution to a four-year institution, looking at their degree completion rates as compared to students originally starting at a four-year institution. Some research has been performed on earnings and employment outcomes of transfer students, but most of it only focuses on college graduates in general without distinguishing between a two-year and four-year degree.

A renewed interest in studying two-year institutions began when Cecilia Rouse wrote a paper reframing the problem surrounding community colleges and the diversion versus democratization effect (Rouse, 1995 and 1998). Previous studies had only focused on the fact that students who attended a community college first were less likely to receive a bachelor's degree. She found that while the presence of community colleges had a diversion effect for some individual students by lowering their expected years of education, overall, they had a greater democratization effect by increasing years of education in general and not significantly affecting the likelihood of graduating with a bachelor's degree.

There have also been a series of papers that have looked at students whose initial intention is to get a bachelor's degree, but choose to begin at a two-year institution and later transfer to a four-year institution. Using the State University of

New York (SUNY) system as a template, Ehrenberg and Smith (2004) looked at the characteristics of two-year institutions to analyze which were most successful at preparing transfer students to succeed in four-year institutions. They also looked at the characteristics of four-year institutions to understand why some were better at absorbing transfer students and helping them to complete a bachelor's degree. Andrew Nutting looked at the best times for transfer students to transfer to a four-year institution in order to have the greatest success in attaining a bachelor's degree, which he found to be after one, two, or four semesters at the community college (Nutting, 2004). He also found that transfer students tend to take a longer time to receive their bachelor's degrees and are more likely to take time off in the middle of their schooling.

It may be assumed that community colleges are of lower educational quality because they do not have the same amount of money or elements that a four-year institution typically has. However, Sandy, Gonzalez, and Hilmer (2006) used a Oaxaca decomposition model on three education datasets to find whether it was the lower quality of the institution or the lower quality of the attending students that led to the lower rates of bachelor's degree completion. They found that the completion rates were mostly attributed to the lower quality of students; however, the lower quality of the education was still a significant factor, and accounted for up to 56% of the lower degree completion rate for students that begin their schooling at a two-year institution. Bridget Long (2009) also looked at whether students starting at a two-year institution suffered a penalty in terms of degree completion probabilities. She found that, even after controlling for selection with a large number of covariates and details about the students, those students who begin at the two-year institutions were 14.5% less likely to complete bachelor's degrees within 9 years. It appears that institutions which focus on transfer students in general can make a difference in student success, as those

students who transfer to campuses with a larger share of transfer students graduate at higher rates; however, this trend is not seen in individual majors (Nutting, 2005). Finally, though the probability of receiving a bachelor's degree may be lower for students that first attend a two-year institution before transferring to a four-year institution, evidence suggests that transfer students often end up transferring to a better four-year institution than the four-year institution they likely would have attended their freshman year as the alternative to the two-year institution.[6] Thus, if there is a greater return in the labor market in terms of earnings or employment from graduating from the better institution, attending a two-year institution first may be the better option for those students.

A variety of studies have looked at public and private institutions and the type of student that enrolls in each type. John Cheslock (2005) looked specifically at the enrollment of transfer students at both public and private four-year institutions. He found that private institutions enroll transfer students as a smaller share of their student body and that the gap in transfer student enrollment between the public and private institutions has grown between 1984 and 1997. The private institutions are also more elastic with respect to transfer student enrollment; as their selectivity increased or their attrition rates decreased, they decreased the share of transfer students enrolled by a greater percentage than the public institutions.

Cellini (2009) also found evidence that there is a market for two-year institutions and that the presence of public two-year institutions affects the presence of private for-profit institutions. She looked at for-profit colleges and community colleges in California and used a regression discontinuity design to isolate the impact of increased public funding for community colleges on the market for two-year

[6] See article by Michael Hilmer (1997), "Does Community College Attendance Provide a Strategic Path to Higher Quality Education".

college education. She looked at the effect both on community college enrollments and on the number of for-profit schools in a local market. She found that bond passage diverts students from the private to the public sector by increasing enrollment in the community colleges, thus causing a corresponding decline in the number of for-profit schools in the market. This paper gives credible evidence to the ideas that the variety of choices available influences student success and that the presence of public institutions affects the presence of private institutions and vice versa.

As mentioned previously, because of the attention the 2010 GAO report placed on for-profit institutions, there have recently been several papers that have focused on the value and returns of an education at a for-profit institution as compared to other types of postsecondary educational institutions. In a recent paper, Stephanie Cellini and Latika Chaudhary (2014) measured the labor market outcomes of students pursuing an associate degree who attended private for-profit colleges as compared to high school graduates with no college degree. They use an individual fixed effects estimation strategy to look at gains in earnings in order to control for time-invariant unobservable characteristics of students. Conditional on employment, they found that students in a private for-profit associate degree program had a 10% gain in earnings. Those same students took approximately 2.6 years to graduate, meaning that the gains averaged to about four percent per year, which is lower than the gains found in other sectors according to the literature. Lang and Weinstein (2013) use BPS data to examine the returns to certificates and associate degrees at for-profits and not-for-profits. They find no statistically significant difference in earnings between receiving a certificate or degree from a for-profit rather than a not-for-profit institution. They also find that there is considerable variation in the return from a certificate/degree across majors and those differences matter much more than any slight differences by institution type. Liu and Belfield (2014) used a small set of data from just two stakes

to look at the effect on wages from starting at a community college and then transferring to a for-profit instead of a public or private not-for-profit institution. There are significant wage penalties for transferring to a for-profit institution, even after accounting for the lower opportunity costs in comparison to other institution types.

There are a couple of papers which performed field experiments to measure the employability of students graduating from a for-profit institution as compared to other institution types. As described in their paper, Darolia, Koedel, Martorell, Wilson, and Perez-Arce (2014) sent fictitious resumes to several employers showing students graduating from different institution types. They found no preference in call backs from employers for students graduating from a for-profit institution, a community college, or no college at all. Deming, Yuchtman, Abulafi, Goldin, and Katz (2015) have a paper where they performed a similar experiment where they assigned various degrees and majors as well as a private for-profit or public institution. They found that a bachelor's degree in business from an online for-profit is 22% less likely to receive a call back than a non-selective public institution. They also found that for health jobs that need no certificate, students from a for-profit are 57% less likely to receive a call back than those from a public community college. They also found no difference in call backs if there was no degree requirement, because the schooling was not a prerequisite, or if the job required a certificate and a license, because another organization was validating the education.

David Deming, Claudia Goldin, and Larry Katz (2012) wrote a paper entitled "The For-Profit Postsecondary School Sector: Nimble Critters or Agile Predators?" This paper describes for-profit institutions in great detail. Much of the focus of their paper looks at the loans given to students attending these institutions and their likelihood of default. They were able to merge data on institutional characteristics

from IPEDS with the National Student Loan Data System (NSLDS) to be able to analyze the three-year Cohort Default Rate (CDR) at the different types of institutions. This monitors how well the institutions prepare their students to be able to repay their loans. Specifically, the CDR measures the percentage of borrowers who enter repayment of federal student loans (by graduating or dropping out), but default before the end of that fiscal year. They also used the Beginning Postsecondary Students Longitudinal Survey (BPS) 2004:2009 cohort to study individual student outcomes. They look at outcomes such as initial persistence and degree completion, as well as the level of debt and the default rate on their loans. The BPS has information on the students' education and employment outcomes for up to six years after the students first began their schooling; it also asks them a number of questions about their experience and their satisfaction with their education, each institution attended, and the value of the tuition and fees that they paid. The authors use standard OLS regressions of student outcomes on a dummy variable for starting postsecondary schooling in a for-profit institution (no distinction on size or focus) and a large set of covariates that contain student baseline characteristics at entry into college. These covariates include dummy variables for race, sex, distance of school from home, living with parents, marital status, single parenthood, independent student, number of kids, use of child care, maternal and paternal education categories, high school diploma, GED receipt, delayed enrollment after high school, certificate or degree program, degree expectations, region, and on or off campus residence. The dataset also included variables for age squared, prior income, household income as a percent of the poverty line, expected family contribution from the FAFSA, individual adjusted gross income from tax returns and government transfers. They also use propensity score (nearest neighbor) matching models with replacement (excluding observations outside of common support) as a second method. They use students who begin at a for-profit

institution as the treatment group and the students who begin in public and private not-for-profit institutions as the control group to compare the average treatment on the treated effect of starting in a for-profit institution. They use the same covariates in the matching models that they used in the OLS regressions.

The authors mention one shortcoming with using data from the BPS: the data only includes those who are first time students in postsecondary education, excluding students who may have started and then dropped out for a year or more before starting a program again. Since the for-profit institutions cater to and enroll a higher fraction of these types of students, this analysis missed a piece of their effectiveness in providing education. However, the NLSY data set has data on students in this position, though at this point it is only available for 8-12 years after turning 18, the typical age in the United States to graduate from high school and have the opportunity to enter postsecondary education for the first time.

Additionally, they fail to control for the choices available to students when choosing the type of institution they will attend. One of the papers by Stephanie Cellini mentioned earlier indicates that entry into for-profit institutions in a local area is influenced by the availability and amount of funding received by public institutions.[7] In fact, Deming, Goldin, and Katz mention Cellini's paper as part of the explanation of why there are more for-profit institutions available in recent years because of lower state education budgets. However, though their regressions are testing the outcomes of students that first attend for-profit institutions, they do not account for the other choices available to the students. Two observationally similar students are likely to make different choices if one is in an area that has five public institutions and one private for-profit institution located nearby and the other is in an

[7] See Cellini 2009, "Crowded Colleges and College Crowd Out: The Impact of Public Subsidies on the Two-Year College Market".

area that has two public institutions and four private for-profit institutions located nearby. Additionally, the level of competition among institutions in terms of producing positive outcomes of education may depend on the market share of postsecondary education an institution controls.

Deming, Goldin, and Katz also do not control for any variables that indicate how academically prepared the students are for college. When looking at student outcomes, it is important to account for previous preparation; including controls for academic preparation in high school will properly compare the outcomes for students, particularly degree completion, as well as employment and earnings.

There are a few recent papers that seek to further answer this question about the potential positives and negatives of for-profit institutions. A paper by Cellini and Goldin (2013) looks at both for-profit institutions that are Title IV eligible and those that are not. They find that the number of for-profit institutions in the U.S. is doubled if non-Title IV schools are counted as well. When comparing similar for-profit institutions that differ mainly on eligibility, they find that the Title IV eligible schools charge tuition that is 78% higher than comparable schools. The dollar amount difference is fairly close to the amount of money that students can usually receive in federal financial aid, showing that many of these schools are capturing much of the aid as extra profit for themselves. A paper by Deming, Goldin, Katz, and Yuchtman (2015) shows that the real and relative price of online education has declined. Most of the online education is focused at for-profit or less selective public institutions, which may become an advantage for students at a for-profit institution in the future. However, the quality of the online education is uncertain, making the benefits to the students unclear. Finally, Gilpin, Saunders, and Stoddard (2013) examined the responsiveness of for-profits and community colleges to changes in occupations in local labor markets. They found that the share of majors in fields related to growing

occupations at for-profit colleges was very responsive, but there was no measureable response at the community colleges. Thus, there is some evidence that the for-profit institutions are taking advantage of all of the money they can receive from the federal government, but they might also be more helpful to students and local labor markets by being more responsive to the needs of both.

### *Description of Postsecondary Education in the United States*

As shown, there have been many studies that focus on the traditional student entering postsecondary education directly out of high school, but very few that focus on less-traditional students, such as those that delay entry into postsecondary education by at least one year. When students graduate high school, they have three potential paths open to them (as shown in the flow chart in Figure 1.1). They can choose to enter the labor market upon graduation and never pursue further education. Alternatively, they can choose to enroll in a postsecondary institution the year immediately following their high school graduation. Finally, they can choose to enter the labor market or another activity for some time (a year or more) before choosing to pursue more education by enrolling in some type of postsecondary institution. Once a student has chosen to pursue postsecondary education, they must choose in which type of institution to enroll: (1) a public four-year institution, (2) a private not-for-profit four-year institution, (3) a private for-profit four-year institution, (4) a public two-year institution (often called a community college), (5) a private not-for-profit two-year institution, and (6) a private for-profit two-year institution.

Each of these types of institution has a slightly different focus and is likely to lead to different outcomes for a particular student and observationally similar students. The question that I address in this essay is which type of institution serves these different demographics best. For this reason, it is important to first understand the

comparisons and differences between these institutions and observe the typical college or university in each category of institution type. It must be noted that oftentimes, the sample size of a group may be so small that it needs to be combined with a similar group for analysis, though this ends up being the case only for the private not-for-profit two-year institutions in this study.[8]

The public four-year institutions are generally state colleges and universities that offer a broad range of majors and include both flagship universities and non-selective institutions. Institutions that are typical of this category are Kansas State University, Eastern Oregon University, and George Mason University. The private not-for-profit four-year institutions also offer a wide variety of areas of study and have a large dispersion in selectivity. Institutions that are typical of this category are Vassar College, Tufts University, Monmouth College, and Brigham Young University-Idaho. In contrast, the private for-profit four-year institutions have a stronger focus on vocations while offering a limited range of degrees in the liberal arts. Argosy University, DeVry University, and ITT Technical Institute are some typical representations of this category. Given the similarities between the public four-year institutions and the private not-for-profit four-year institutions, I would be willing to group these categories together. However, I would be unwilling to group the four-year private for-profit institutions with these groups.

In comparing the two-year institutions, the similarities run differently. The public two-year institutions include many vocation-oriented institutions in health or technology, but they also include many community colleges with a focus on the general arts and sciences that easily transfer to a four-year institution. Schools that are typical of this group include Finger Lakes Community College, Mesa Community College, and Savannah Technical College. While the private not-for-profit two-year

[8] See Table 1.1 for table showing how many students fall into each cell.

institutions have a few schools that offer a greater focus of degrees and majors, the majority of them focus on vocations in the areas of health, beauty, and technical/computer services. Goodwin College, Northeastern Hospital School of Nursing, and United Tribes Technical College are typical examples of this group of institutions. Finally, the private for-profit two-year institutions also focus on vocational areas like law or business, health, beauty, and technical/computer services. The typical institutions include Remington College, Lexington Beauty College, and Southeast Culinary & Hospitality College. Thus, when looking at the small number of students attending the private not-for-profit two-year institutions, it makes sense to combine the private not-for-profit students with the private for-profit students because the basic makeup of the schools at the two-year level is almost identical.

Additionally, the four-year private for-profit institutions are quite similar in focus to the two-year private for-profit institutions and could potentially be combined with them if necessary. However, the difference in the length of time to degree and the types of degrees offered may muddle the interpretation of the results. Thus, for this research, I leave the four-year private for-profit institutions in their own category. The two-year private not-for-profit institutions have very few students attending those institutions, so they will be combined with the two-year private for-profit institutions in this study.[9]

In considering students who choose to enroll later in postsecondary education, there are a variety of reasons why they may choose to delay enrollment. They may have been disinterested and performed poorly in high school, but then gained a little maturity, responsibility, and perspective after a year or more in the labor market. They may be students who had personal or family situations emerge that made postsecondary schooling immediately following graduation difficult or impractical.

[9] Table 1.2 shows what the numbers in each cell would be under the proposed combined groupings.

They may have had an extreme financial deficit and needed to earn and save money for a year or more before being able to begin postsecondary education. Most of the circumstances that would compel students to delay enrollment are likely to impact their eventual outcomes as well, so that they are less likely to perform at the same level as those who do enroll in college directly out of high school. Yet, in comparison to those students, to high school graduates that never attend college, and to each other, these students can be served better by particular institution types ; this is because these institutions have features that are more flexible or more amenable to their different and, perhaps more difficult, circumstances.

***Methodology***

When considering the question posed in the previous section, the first method of comparison that I will employ is Ordinary Least Squares (OLS) regressions. I will look specifically at the educational and labor market outcomes of (a) log wage, (b) log weekly earnings, (c) personal household income by age 25, (d) credits completed, (e) progress toward an associate degree or bachelor's degree, (f) and attaining an associate or bachelor's degree. I will use a rich set of covariates as well as dummy variables for the choice of attending each institutional type, for delayed enrollment (gap year), and interaction terms between the institutional type and the gap year dummy. Consider the OLS regression equation:

$$y = \hat{\beta}X + \widehat{\gamma_1}4yrPublic + \widehat{\gamma_2}4yrPrivateNP + \widehat{\gamma_3}4yrPrivateFP + \widehat{\gamma_4}2yrpublic + \widehat{\gamma_5}2yrPrivateNP + \widehat{\gamma_6}2yrPrivateFP + \widehat{\alpha_1}z + \widehat{\delta_1}4yrPublic * z + \widehat{\delta_2}4yrPrivateNP * z + \widehat{\delta_3}4yrPrivateFP * z + \widehat{\delta_4}2yrpublic * z + \widehat{\delta_5}2yrPrivateNP * z + \widehat{\delta_6}2yrPrivateFP * z$$

Where y= labor market and education outcomes and z=1 if delayed enrollment in postsecondary education and z=0 otherwise. This will make it so that the base

comparison group is comprised of high school graduates that are not observed enrolling in college when y measures labor market outcomes. Because the high school graduates do not have any college academic outcomes, the $4yrPublic$ and $4yrPublic * z$ variables are excluded from the regressions involving academic outcomes in order to make the students attending a public four-year institution the base comparison group. Additionally, as mentioned above, very few students attended private not-for-profit two-year institutions. Thus, in all specifications these students have been combined with the students attending private for-profit two-year institutions. The variables of $2yrPrivateNP$ and $2yrPrivateFP$ combine to create a new variable: $2yrPrivate$. Similarly, the interaction variables $2yrPrivateNP * z$ and $2yrPrivateFP * z$ combine to form $2yrPrivate * z$. The covariates X include variables such as race, ethnicity, gender, age at high school completion, family income while attending high school, high school GPA, math and verbal exam scores from the ACT or SAT for those individuals that have them, ASVAB scores, share of high school classes in math, science, and foreign languages, number of postsecondary institutions located in the high school graduate's county at the time of graduation, the average tuition level for those nearby postsecondary institutions, the share of each type of institution in the graduate's county, and local (county) labor market unemployment.

In addition to OLS regressions, I employ a nested multinomial logit model form of propensity score matching. This method of extending traditional propensity score matching as found in the binomial case was first presented in theory by Imbens (2000) and Lechner (2001). It was later implemented by Lechner (2002) in an empirical application to the labor market and has been used in other areas of economics, such as pharmacoeconomics in the study of different medical treatments[10]. This method allows for entry into multiple mutually exclusive treatment options

[10] Example of usage in pharmacoeconomics (http://www.ispor.org/news/articles/mar08/psm.asp)

(instead of only two) that you can then condition the results upon. The practical application of propensity score matching to this model is fairly straightforward.

The use of this method relies on the conditional independence assumption (CIA), which states that the outcomes of the various treatments must be independent of the selection into the various treatments, conditional on exogenous characteristics of the individual. All of the characteristics that would affect both the choice of treatment and the outcome of any treatment must be included as control variables in order for the above to hold. Below, where I describe in detail how I will apply this method to my data, I describe the variables included to meet the conditions of this assumption.

Consider the case where a participant faces *1,…,M* mutually exclusive treatment options, instead of the typical option to participate or not participate. Lechner (2001) shows, in a multiple treatment options scenario, we can find the average treatment effect on the treated using:

$$\theta_0^{m,l} = E(Y^m|S = m) + E_{P^{l|ml}(X)}\{E(Y^l|P^{l|ml}(X), S = l)|S = m\}$$

where

$$P^{l|ml}(x) := P^{l|ml}(S = l|S = l \text{ or } S = m, X = x).$$

To be able to estimate $\theta_0^{m,l}$, I need to estimate the probabilities of selecting one of the treatments *l* ($P^{l|ml}(x)$) when given a choice between treatments *m* and *l*. There are two possible approaches to producing the selection probabilities. The method that I use in this essay is to model and estimate *M(M-1)/2* binary conditional probabilities $P^{l|ml}(x)$ for each combination of treatment alternatives *m* and *l*. The alternative method is to use a nested logit to formulate the complete choice problem in one model. This calculates all of the probabilities $[\hat{P}_N^1(x), \dots, \hat{P}_N^M(x)]$ at once; however, it does impose a few more restrictions because the derived conditional probabilities are interdependent. This also means that if one choice equation is misspecified, all

conditional probabilities could be misspecified.

I use a random utility maximization (RUM) model consistent nested logit to compute the marginal participation probabilities of each treatment conditional on the characteristics of the high school graduate. In a RUM framework, a decision maker *i* consumes alternative or treatment *l* to obtain utility

$$U_{il} = V_{il} + \varepsilon_{il} = \alpha_l + \boldsymbol{x}_{il}\beta_l + \boldsymbol{z}_i\gamma_l + \varepsilon_{il}$$

Where $V_{il}$ is the deterministic part of utility and $\varepsilon_{il}$ is the random part. $\boldsymbol{x}_{il}$ are alternative-specific variables and $\boldsymbol{z}_i$ are case-specific variables. The assumption on the set of errors $\varepsilon_{i1},\ldots,\varepsilon_{iM}$ is that they follow the generalized extreme-value distribution. This is a generalization of the type 1 extreme-value distribution that allows the alternatives within nests of the tree structure to be correlated. There is a dissimilarity parameter defined as $\tau_m = \sqrt{1-\rho_m}$, where $\rho_m$ denotes the correlation in nest *m*. If $\tau_m = 0$, that implies that the alternatives in nest *m* are perfectly correlated, but $\tau_m = 1$ implies independence between the alternatives in nest *m*.

The expected value of the utility that decision maker *i* obtains by consuming an alternative in nest *m* is the inclusive value for the *m*th nest, denoted by $\mathrm{IV}_m$:

$$\mathrm{IV}_m = \ln \sum_{k \in B_m} \exp(V_k/\tau_m)$$

where $\mathrm{B}_m$ represents the set of alternatives in nest *m*. Given the inclusive values, the probability that random-utility-maximizing decision maker *i* chooses alternative *j* is

$$\mathrm{Pr}_j = \frac{\exp\{V_j/\tau(j)\}}{\exp\{\mathrm{IV}(j)\}} \frac{\exp\{\tau(j)\mathrm{IV}(j)\}}{\sum_m \exp(\tau_m \mathrm{IV}_m)}$$

where $\tau(j)$ and $\mathrm{IV}(j)$ are the dissimilarity parameter and inclusive value for the nest in which alternative *j* lies. By scaling $V_{ij}$ within each nest, the RUM consistent model allows utilities to be compared across nests. Without the rescaling, utilities can be compared only for goods within the same nest. Also, adding a constant to each $V_{ij}$ for consumer *i* will not affect the probabilities of the RUM model.

I use the estimation results of a random utility maximization (RUM) consistent

nested logit model to compute the marginal participation probabilities of each treatment conditional on the characteristics $\boldsymbol{x}_{ij}$ and $\boldsymbol{z}_i$, the variables included for the selection equations. I calculate the marginal probabilities $\hat{P}_N^{l|ml}(x)$ using the estimates of the nested logit model $[\hat{P}_N^1(x), \ldots, \hat{P}_N^M(x)]$ in the following way:

$$\hat{P}_N^{l|ml}(x) = \frac{\hat{P}_N^l(x)}{\hat{P}_N^l(x) + \hat{P}_N^m(x)}$$

It is important to examine the common support, or to see how these probabilities are distributed for each group that selected into a treatment for each of the different treatments to see how well they are balanced and that they overlap sufficiently in each subsample of treatments *l* and *m*. I can then use the marginal participation probabilities for nearest neighbor matching with replacement (excluding observations outside of the common support)[11]. Using these matches, I can then compare the average treatment effect on the treated for the labor market and academic outcomes as compared to the case chosen as a base case.

When constructing the propensity scores for each student, I use the RUM consistent nested logit model to find the probabilities of high school graduates self-selecting into one of three states based on observable characteristics: (1) no observed enrollment into postsecondary education, (2) enrollment into postsecondary education within six months of graduating from high school, and (3) enrollment into postsecondary education more than six months after graduating from high school. Though the entire nested logit model includes all of the controls X that were used in the OLS regressions, this level of the selection equations generally contains those variables most likely to influence the timing of attending college. These variables generally include those likely to affect financial constraints or academic preparation, such as household income while in high school, high school GPA, class credits, and exam scores.

[11] Nearest neighbor matching is used as described in Table 1 from Lechner 2002.

The nested multinomial logit model also provides estimates of the probabilities of the larger set of eleven choices: never enrolling in college and directly enrolling in one of five types of institutions or delaying enrollment in one of those five types of intstitutions. The five institution types (the two private two-year institutions are combined) that students can choose from when deciding where to attend school are: (1) a public four-year institution, (2) a private not-for-profit four-year institution, (3) a private for-profit four-year institution, (4) a public two-year institution (often called a community college), and (5) a private not-for-profit two-year institution or a private for-profit two-year institution. As before the model also shows which factors impact selection into these different treatment options the most. Included in the selection equation at this level are the demographic variables and information on the local postsecondary institutions, such as share of each type and average tuition for each type.

There are several ways that the variables can be included and excluded from each level of the selection equations. First, a multinomial logit equation is estimated to determine and predict the probabilities of the timing of college enrollment as described above: (1) no observed enrollment into postsecondary education, (2) enrollment into postsecondary education within six months of graduating from high school, and (3) enrollment into postsecondary education more than six months after graduating from high school. Then for branches (2) and (3), two separate multinomial logit equations are estimated to determine and predict the probabilities of students choosing which type of institution to attend conditional on either direct or delayed enrollment in college.

Using this method has two important effects on the assumptions of the models. The first effect is that the multinomial equations will require the assumption that there is independence between the alternatives at the first level, or on the timing decision.

This essentially forces the dissimilarity parameters for gap year students and direct-to-college students to equal 1. In the simpler models, we can test if this is a reasonable assumption. As a note, $\tau_{No\ College} = 1$ because *No College* is a degenerate branch with no further options under that choice. The second effect is that more restrictions are placed on the timing of decisions made by the students. This method involving multiple multinomial equations requires a sequential or chronological element to the choices made which is likely true in this situation. Students generally choose to attend college and then look at which college they would like to attend.

Finally, using nearest neighbor matching with replacement, I find the average treatment on the treated (ATT) effect and compare how productive each of the types of institutions is in producing positive results of the various education and labor market outcomes of (a) log wage, (b) log weekly earnings, (c) personal household income by age 25, (d) credits completed, (e) progress toward an associate degree or bachelor's degree, and (f) attaining an associate or bachelor's degree. First, I look at the ATT effect of directly enrolling in college and delaying enrollment in college as compared to high school graduates who are never observed enrolling in college. Then I look at the ATT effect by choice of institutional type and the timing of enrollment in college as compared to high school graduates. Finally, I look at the ATT effects of the institutional choices of gap year students as compared to gap year students attending a public four-year institution in order to directly determine which type of institution offers the best labor market and academic outcomes for gap year students. I also look at the ATT effects of the institutional choices of students who directly enroll in college as compared to those who directly enroll in public four-year institutions to see how it compares to what we find for gap year students.

***Data***

The National Longitudinal Survey of Youth of 1997 (NLSY97) is a survey of a representative sample of youth ages 12-16 as of December 31, 1996. The first survey took place in 1997 and rounds of interviews have continued annually through the most recent round conducted in 2010. The purpose of the NLSY97 is to track youth during the important stage of transitioning from education to employment through young adulthood. It includes information on youths' schooling history in high school and their performance on standardized tests, as well as following their progress in postsecondary education. It also has information on their employment history, with start and stop times listed for each job as well as earnings.

The NLSY97 includes both young adults that have chosen to enter employment directly after high school as well as those that enter various levels of postsecondary education. This is an advantage because I can compare gap year students not only to students directly enrolling in college, but also to young adults that chose not to enter postsecondary education during the observed time period. Additionally, the NLSY97 contains information on the employment outcomes for each of the young adults included in the survey. Thus, we can find out how the type of education, as well as the timing of education, influenced labor market outcomes. This is important because one of the major benefits of education is the acquisition of human capital.

The restricted use Geocode data from the NLSY97 also contains geographic information on the students. It has information on the county of residence for the students as well as the specific unit IDs of the postsecondary institutions that students chose to attend; these unit IDs correspond to those used in the Integrated Postsecondary Education Data System (IPEDS). IPEDS contains information on the location of public, private not-for-profit, and private for-profit institutions, both four-

year and two-year or less, that meet the standards to be eligible for Title IV aid. This means that it does not include some less than 2 year institutions that offer certificates but not degrees, or that are not accredited. However, the business models of many private for-profit institutions include getting money from the federal government in the form of financial aid grants and loans; these institutions are then included in the IPEDS data bank. Thus, though this measure does not account for all of the choices that a student has for postsecondary schooling, it captures most of them.

Looking at Table 1.3 Table 1.3gives a basic idea of the differences between high school graduates who choose to enroll directly in college, who delay enrollment in college, and those never observed enrolling in college. For those students who enroll directly in college, we see that they have an average of 3.3 months between high school graduation and college attendance, while gap year students have an average of 33.2 months after high school graduation before they first enroll in college. High school graduates that are never observed enrolling in college are observed for an average of 99.5 months after high school graduation. It is not surprising that students who enroll directly in college have a small number of months between graduation and enrollment; by construction, this group is defined as those enrolling in college within six months or less of high school graduation. The cutoff at six months or less was chosen because previous literature has shown that enrolling even one semester off-cohort can be disruptive for students enrolling in college and affect their performance negatively. The majority of papers looking at gap year students use this cutoff because it likely allows students the normal summer break even if they graduate early without allowing them to miss the fall semester before enrolling.

There are a few differences between groups according to their demographic makeup. Mirroring recent trends, we see a higher share of students enrolling in college at any time are female, with the highest share at 55.2% female for students

enrolling directly and a nearly equally share for delayed entry students at 51.5% female. The share of high school graduates who are black moves in the opposite direction, with the smallest share, only 20% black, for direct-entry students and the largest share, 30% black, for those never attending college – similar to the share for delayed entry at 28.3% black. It is interesting to note that for Hispanic students, the highest share of Hispanics is found among those that delay postsecondary enrollment with 25.7% Hispanic as compared to 15.6% for direct enrollment and 30.0% for no enrollment. There is a very small age difference at high school graduation for students who enroll in college directly or delayed, but high school graduates that are never observed enrolling in college are on average 9 months older than students enrolling in college. The biggest difference among the categories is the disparity that we see with their household income while the students were in high school in 1997. The families were ranked according to their income percentile and we see that those students enrolling in college directly are ranked 13% and 20% higher than those who delay enrollment and don't enroll, respectively. In a later section, I will discuss how household income affects high school graduates' selection and decisions on enrollment timing and college type.

Another characteristic that influences student decisions about postsecondary education is their academic performance in high school. In Table 1.3Table 1.3, we can see that high school graduates who enroll directly in college perform better on each measure of high school academic success as compared to those who delay enrollment, and they in turn perform better than those high school graduates that we never observe enrolling in college. The direct-entry students perform better on their SAT scores and receive higher grade point averages. They are also less likely to receive a GED rather than a traditional high school diploma. Higher shares of their high school credits are found in math, science, and foreign language classes, indicating

greater preparation for college. They also perform better on the Armed Services Vocational Aptitude Battery (ASVAB), the entrance test to enlist in the United States Military; this test is intended to determine the student's mental aptitude to enroll in a branch of the military and determine for which military jobs he or she has the mental aptitude to perform. Those high school graduates that delay enrollment in postsecondary education perform worse on all of the above metrics than direct-entry students, but better than those who are never observed enrolling in college.

Local geographic variables are also likely to influence the timing of a high school graduate's enrollment in college. I found the unemployment rate by county for the students at the time that they graduate from high school using the American Community Survey. For those enrolling directly in college, they actually experience the lowest average unemployment rate in their counties at 3.73%, while those that delay enrollment have the highest average unemployment rate in their counties at 3.92%, with those with no college enrollment falling in between with an average unemployment rate of 3.85%. Another factor that may influence enrollment in college is the number of postsecondary institutions nearby and their average tuition price, found using the Integrated Postsecondary Education Data System (IPEDS). Students who delay enrollment in college have the highest number of postsecondary institutions within the county of residence at an average of 35 institutions, while those who enroll directly have an average of 30.9 institutions and those who are never observed enrolling have only 28.7 institutions on average. Additionally, the average tuition reported by the institutions in the county of residence is cheapest for those students enrolling in college directly and most expensive for those high school graduates that are not observed enrolling in college.

The academic and labor market outcomes for each of the three types of high school graduates are also shown in Table 1.3Table 1.3. The natural log of the weekly

wage six years after graduating from high school is virtually the same for each of the groups, though slightly larger for those students enrolling directly into college. However, the bigger difference shows up in the natural log of the weekly earnings six years after high school graduation for the three groups with the students directly enrolling into college earning the most and those that are never observed attending college earning the least. The difference may not be as large as it could be, but the dataset follows the youngest cohort of high school graduates for only six years after the typical high school graduation. The higher earnings imply more hours for those high school graduates enrolled directly in college because their wage rates are so similar. Household income at age 25 is not statistically significantly different between all types of high school graduates.

The high school graduates with direct entry into postsecondary education fared similarly well when considering their academic outcomes. Those students who enrolled directly completed more credits on average toward associate and bachelor's degrees as compared with students who delayed enrollment. However, total credits completed each semester were about a half credit less for the direct enrollment students. A similar share of direct enrollment students and delayed enrollment students completed an associate degree, but twice as many direct enrollment students completed a bachelor's degree (76.8% compared to 34.2%).

As the literature has shown, this dataset also shows that students who delay enrollment into college have worse outcomes on average than those students who enroll directly. Additionally, students who delay enrollment come from families with lower incomes and have poorer academic performance and preparation in high school. The next section discusses how the results change as we control for student background, and integrate how their background and local characteristics affect choice of enrollment timing and college type.

### *Discussion of Results*

#### *Ordinary Least Squares Regressions*

Table 1.4 presents the results of the OLS regressions on several labor market outcomes for high school graduates that directly attend college, delay enrollment in college, or are never observed enrolling in college. Each specification in this table includes detailed controls, such as race, ethnicity, and gender dummy variables; family household income when attending high school; age at high school graduation; high school GPA; ASVAB scores; SAT math and verbal scores; shares of total high school credits taken in science, math, and foreign languages; the number of postsecondary institutions in the graduate's county; the average tuition charged at those institutions; and the unemployment rate in the graduate's county. Table 1.5 includes the same controls and instead presents the results for the OLS regressions on academic outcomes.

Looking at the first column of Table 1.4, we see that both gap year students and those students directly enrolling in college in any sector make about the same log wage six years after high school graduation as those who were their comparative counterparts in high school that we never observe going to college. This essentially does not change as interactions with gap year status and type of institution is included in column (2). There is a slight, but still insignificant, increase in the coefficient for a gap year student, but this is accompanied by a small, negative and insignificant coefficient on each of the newly introduced interaction gap year variables, showing that gap year students earn basically the same log wage as the other types of high school graduates. We might expect to see higher wages for those high school graduates attending college, but this outcome captures wages at only six years after high school graduation. It is likely that this is at or near the crossover point where those with college education are just about to overtake the wage levels of those who

spent years working rather than attending school, and thus have higher wages from more work experience rather than from more education. As time continues, it is likely that those students who attended college would show a more dramatic difference in wages.

However, when we look at column (3) of Table 1.4, we see that gap year students have about 9% lower weekly earnings than direct enrollment students, though they are still better off than graduates who are never observed enrolling in college. When we introduce the gap year and institution type interaction variables in column (4) we see that the coefficients are negative for all of types of institutions though larger in magnitude and significant for gap year students enrolling in the private two-year institutions. Those directly enrolling in college make between 30-50% more in weekly earnings than those never attending college. Given that the model measuring the effects on log wage between the three types of students showed virtually no difference, this means that gap year and direct enrollment students likely work more hours in a week than graduates who never enroll in college.

When looking at personal household income at age 25 in columns (5) and (6), the only significant and negative effect shows up with direct enrollment students attending the private for-profit four-year institutions. However, this effect is only significant at the 10% level and is not present until the gap year interaction variables are included, thus isolating the negative effect to direct enrollment students. This may be a result of the high debt to earnings ratios that attendees of for-profit institutions are found to have.

Table 1.5 presents the academic outcomes for gap year and direct enrollment students, as these outcomes do not apply to high school graduates that are never observed going to college. It includes the same control variables mentioned for Table 1.4. The public four-year institution variable and the gap year and public four-year

interaction variable are not included as they serve as the base comparison group. As shown in column (9), students attending either type of private four-year institution complete 1.2-2.6 fewer credits than those attending a public four-year institution. However, in column (10) it is interesting to note that gap year students attending a private not-for-profit four-year institutions have a net effect of earning 2.2 more credits than direct-to-college students at a public four-year institution, while gap year students attending a public four-year institution earn 3.3 more credits than direct enrollment students. The net effect on credits completed for gap year students at other types of institutions is about the same as direct enrollment students at a four-year institution. Direct enrollment students complete 1.2-3.7 fewer credits at private four-year institutions as compared to a public four-year institution. When comparing gap year students to the students that directly enrolled at each institution type, we find that gap year students complete 3.2-3.4 more credits than direct enrollment students at four-year institutions and 1.2-2.6 fewer credits at two-year institutions. However, these effects in reality are quite small since a typical college class is usually three credits.

In considering progress toward associate degrees in columns (11) and (12) of Table 1.5, gap year students focused on attaining those degrees earn 9-10% fewer credits of the minimum necessary to get an AA degree, as compared to students directly enrolling in a public four-year university. This likely contributes to the result we see in column (15) that shows that gap year students are about 8.7% less likely to complete an associate degree. As the gap year and institution type interaction variables are included in column (16), much of the negative effect on associate degree completion has moved to the interaction variables though most of them are not statistically significant. A strong effect on associate degree completion is found at the private two-year institutions, where many of the students pursuing an associate degree

can be found. The private two-year institutions show up to a 46.1% increase in the completion of associate degrees for direct enrollment students, though the net effect for gap year students at these institutions is close to zero. Looking at private for-profit four-year institutions, both types of students complete up to 10% more of the required credits for an associate degree and are about 20% more likely to complete an associate degree as compared to students at a public four-year institution. Private for-profit four-year institutions generally offer associate degrees for their students, so perhaps they are well practiced at encouraging students to complete the credits necessary for at least an associate degree. It may be possible that some students attending the for-profit institutions end up deciding to just get an associate degree instead of a higher degree. It is important to note that in the associate degree progress specifications, these only include students who identified that an associate degree is their intended goal, but the completion of the associate degree may include both types of students.

In looking at progress toward a bachelor's degree and completion in columns (13), (14), (17), and (18), we see similar effects for gap year students but the opposite effect for private for-profit institutions. Gap year students earn 11.5-14% fewer of the required credits for a bachelor's degree when compared to direct enrollment students at public four-year universities (see columns (13) and (14)). This leads to a significantly negative decrease of 20.5-21.2% in the likelihood that they will complete a bachelor's degree as compared to direct enrollment students at a public four-year institution as shown in columns (17) and (18). Other than the general negative effect of delayed enrollment on bachelor's degree achievement, there is no difference among institution types for gap year students. Both types of students at private not-for-profit institutions experience up to a 3.3% increase in earned required credits for a bachelor's degree as well as a 6.2-6.8% increase in bachelor's degree completion as compared to students at a public four-year institution. While both two-year and four-

year private for-profit institutions are less helpful, the negative effects are only significant for the private two-year institutions. Students attending a private two-year institution earn 25.7-33.2% fewer required credits for a bachelor's degree as compared to public four-year institutions. These same students are also 24.9-26.5% less likely to complete a bachelor's degree than students at public four-year institutions. Students at public two-year institutions also complete 5.7-6.7% fewer required credits towards a bachelor's degree leading to a 13.1-13.8% lower likelihood of completing a bachelor's degree. This provides some evidence that students may have a hard time transitioning from two-year to four-year institutions in order to further progress toward and complete their bachelor's degree.

***Propensity Score Matching – Selection Equations***

Though the results of the OLS regressions gives an overall idea of the academic and labor market outcomes for these different types of students, they do not properly control for the fact that students select themselves into the various categories, even with the inclusion of so many characteristics describing the person at the time of high school graduation. As explained previously, in an attempt to control for self-selection, I use propensity score (nearest neighbor) matching to find the average treatment on the treated effect.

I use two separate multinomial logit models, one nested within the other, to control for selection and calculate the probabilities used to calculate the propensity scores for matching. This also identifies how the various factors affect high school graduates' selection into the various options. As described earlier, there are two levels at which a decision and self-selection is made. The first level is the decision on timing of college enrollment, as illustrated by the timing selection equation. The second level is which type of postsecondary institution to attend, which is represented by the type

selection equation. Of the various observable characteristics available, it is important to decide which variables belong to each selection equation; though I tried several models, I include two representative models in this essay. Below, I describe why those variables are in each equation and how selection and the average treatment on the treated results are affected by the changes in the models. The choice of model did not greatly affect the results.

Table 1.6 shows the definite and probable assignments of each variable used in the selection equations and which variables were actually used in each model. The race, ethnicity, and gender variables likely belong to both the timing and type selection equations. Many studies show that recently, more women attend college at every level; these studies also show that racial and ethnic culture strongly influence whether a student attends college, how far from home he or she will travel to college, and which type of institution he or she will attend. Household income generally affects a student's decision at each level. It is likely to affect the timing of entry into college because many students delay enrollment due to financial constraints. It is also likely to affect which type of institution a student attends; even with financial aid available at many institutions, public institutions are still relatively cheaper to attend. Also, certain institutions, such as private for-profit institutions, may target low income students and encourage them to apply for federal loans and grants in order to receive that money.

Several variables deal with academic preparation in high school and are most likely to affect the timing decision, though some may also influence the type of institution chosen. As mentioned before, a study found that students with poor academic preparation in high school were more uncertain about their post-graduation plans, thus, being more likely to take a gap year before enrolling in college.[12] The older a student is when he graduates from high school, the less likely he is to be a

[12] See Andrew Martin (2010).

traditional type of student and enroll directly in postsecondary education. Age also may influence the type of institution that the student attends if some institutions cater more toward older, nontraditional students. Other variables that are likely to signal academic preparation is the student's high school GPA; the share of high school credits in math, science, or foreign languages; and exam scores like the SAT or ACT. The SAT score received may provide a signal to students and recruiters of their academic preparation, influencing a student's decision on the type of institution to attend; this is because four-year institutions, particularly private not-for-profit institutions, are likely to be more selective, while many public and private for-profit two-year institutions will accept anyone regardless of their exam scores. Whether or not the student has an exam score can be an indicator of the seriousness of their future plans to attend college. Finally, inasmuch as the ASVAB score captures some measure of ability, it could influence both the timing of attending college and which type of college a student chooses to attend.

Many students actually attend a college or university near their home, so the availability or total number of postsecondary institutions in their area is likely to have an effect on the timing of college enrollment. However, the share of each type of institution available to the student is likely to be much more important in the type selection equation, rather than the overall number of institutions. When high school students consider whether or not to attend college, it is likely that they will have a general feel for how expensive college is based on the local options; therefore, the tuition average of the postsecondary institutions in the students' county is included in the timing selection equation.

When high school graduates decide whether to directly enroll in college or not, they also consider their opportunity cost or outside options. They may choose to get a job instead of attending school. However, if the local unemployment rate is high,

college becomes a more attractive option because of the lower likelihood of finding a job. Though the unemployment rate is likely to influence the timing of college enrollment, it will not affect which type of institution a student chooses to enroll in. A graduate may also get married or have children; this raises the opportunity cost of receiving postsecondary education. As mentioned earlier, a study by Goldrick-Rab and Han (2011) showed that these events affect the timing of students' enrollment differently by socioeconomic status. Some institutions may be more flexible and cater to the special needs of students with a family, so these family related variables potentially affect the type of institution a student attends as well. Finally, it is likely that the educational examples of the students' parents will influence timing of college enrollment as well as the type of institution attended. For example, the child of a college graduate is much more likely to be a traditional type of college student as compared to a child who is the educational pioneer of the family.

As illustrated in Table 1.6, Model D has race, ethnicity, gender, and household income as the only variables found in both equations. It also includes the marriage and child before college variables to the college type selection equation. Model F uses Model D as its base model, but additionally includes the age at high school graduation to the type selection equation and mother's and father's education to both of the selection equations.

The selection equations found that students who are older at high school graduation are much more likely to never enroll in college, but if they do enroll in college, they are more likely to choose public two year institutions. Female students are more likely to enroll in college, directly even more than after a gap year. Hispanic students are more likely to enroll directly after high school graduation, though all Hispanic students are more likely to enroll in any type of two-year institution as compared to any type of four-year institution. High school graduates that come from

lower income households are more likely to enroll in private for-profit two-year and four-year institutions, and they are more likely to enroll after a gap year if they choose to enroll in college at all. This could be due to private for-profit institutions' aggressive recruiting techniques. Also, students who had a major life event before enrolling in college, such as getting married or having a child, were much less likely to enroll in college at all; if they did, it was more likely that they would delay entry. Those who were from high-income households but got married before college enrollment were even less likely to enroll in college at all, even after a gap year.

***Propensity Score Matching – Average Treatment on the Treated Effects***

As mentioned in the methodology section, I used the results of the selection equations to create propensity scores for each of the students and their likelihood to enroll in college either directly or delayed, as well as their likelihood to enroll in each of the types of institution. Essentially, every student had eleven propensity scores, one for each of the paths they might have taken, with which they could be matched. Using nearest neighbor matching, the average treatment on the treated (ATT) effects for their labor market and educational outcomes are calculated by comparing the average results for one group to the average results for a group that is similar according to the propensity score but made a different choice. This was done for each decision of when to enroll in college and which type of postsecondary institution to attend.

Table 1.7 looks at the ATT effects from Model D of the timing decision on high school graduates' academic and labor market outcomes. Gap year students experience a 17.6% increase in earnings compared to high school graduates who are never observed enrolling in college, though this is only significant at the 10% level. For Model F found in Table 1.8, the significance dissipates and the magnitudes of the effect diminish. The third column of Table 1.7 and Table 1.8 compares delayed

enrollment students to direct-to-college students and shows that earnings at six years after high school graduation for students who directly enroll in college are between 12.3-14.5% more than those who delayed enrollment. This result is consistent through all tested models.

Academic outcomes only appear in the third column of Table 1.7 and Table 1.8 comparing delayed and direct enrollment students since the high school graduates never observed enrolling in college have no attempted academic outcomes with which to compare. The delayed enrollment students complete about 6.8-10.4% less progress toward their associate degree and 9.2-11.3% less progress toward their bachelor's degree than comparable direct enrollment students. Not surprisingly, these results also lead to lower attainment of actual associate and bachelor's degrees for delayed enrollment students by 4.6-6.2% and up to 21.6% fewer degrees, respectively. The lower attainment for associate and bachelor's degrees does become insignificant in a few models, though was fairly consistent throughout all models.

Table 1.7 and Table 1.8 gave a general overview of the average treatment on the treated effects of the choice to enroll in college and the timing of that choice. The remainder of the tables group the students attending college by institution type of initial enrollment as well as delayed or direct enrollment. The ATT effects in Table 1.9 and Table 1.10 show the effects on labor market outcomes for gap year and direct-to-college students split up by institution type as compared to high school graduates who are never observed enrolling in college for Models D and F, respectively. Nothing really stood out in the comparison of direct enrollment students to the high school graduates in the lower panels of the tables. The most interesting and most robust finding for gap year students is how their earnings compare to the high school graduates, as found in the upper panels of Table 1.9 and Table 1.10. The strongest and most consistent results are those showing that gap year students who initially enroll in

a public two-year institution earn about 20-23% more than those who are never observed enrolling in college. Additionally, we find that gap year students initially enrolling in a private for-profit four-year institution potentially earn up to 46% more. A weaker finding is that those enrolling in a private not-for-profit four-year institution earn less, perhaps by as much as 57%. Even when this effect was not significant, the sign was fairly consistently negative across models, indicating that they may earn less than the high school graduates never observed enrolling in college.

The next set of tables, Table 1.11 and Table 1.12, compare gap year students to just each other – specifically, how well gap year students do in each of the labor market or academic outcomes as compared to gap year students that initially attend a public four-year institution. It appears that most gap year students receive similar wages and earnings as those gap year students that attended a public four-year institution. The two models shown in Table 1.11 and Table 1.12 indicate that those attending a private two-year institution received lower wages and earnings. This is confirmed as statistically significant in over half of the other models that were tested, though not shown in this essay. The lower earnings could be a result of the degrees earned at these mostly vocation-oriented institutions. There is also some evidence that may show that students initially attending a private for-profit four-year institution may have lower wages and those attending a private not-for-profit four-year institution may have lower earnings. However, this evidence is not as strong since these only show up as statistically significant in less than half of the models. In comparing their household incomes at age 25, there is no discernible difference among gap year students.

These same tables also give the opportunity to directly compare academic outcomes of gap year students to gap year students attending public four-year institutions. Gap year students attending a public two-year institution show consistent

evidence of completing about 4.5 fewer credits than those at a public four-year institution. The two models shown are statistically significant at the 5% and 1% levels, but all of the models tested have a negative coefficient for those students and over half of them are statistically significant. When looking at progress towards a degree, there is no consistent evidence that students make better progress toward a bachelor's degree at any one type of school. However, students initially attending private for-profit four-year institutions show evidence of 21.5-24.2% more progress toward an associate degree than those at public four-year institutions, while those at private not-for-profit institutions show similar evidence, but not quite as consistently. These results are somewhat echoed in looking at actual completion of degrees, where the type of institution does not matter for bachelor's degrees; however, private for-profit four-year institutions may show that students there are more likely to complete an associate degree as compared to students at public four-year institutions, though the results are not statistically significant in the models shown. Thus, for students who delay enrollment in college for at least six months after high school graduation, there is no clear winner for both labor and academic outcomes. Academically, gap year students seeking an associate degree might do best at a private four-year institution. However, these same institutions show small evidence of potentially lower wages. The private two-year institutions show evidence of lower wages and earnings compared to those attending a public four-year institution. It appears that for gap year students, there is no real advantage to attending a private not-for-profit four-year university instead of a public four-year university; so, if there is a large price tag difference, it may be better for students to attend the public four-year university. Generally, it does not appear to matter which type of institution gap year students attend, though they may want to avoid the private two-year institutions, so they should attend whichever school is most convenient and economical for their career goals.

In contrast, Table 1.13 and Table 1.14 show the labor market and academic outcomes for just students directly enrolling in each institution type as compared to students directly enrolling in a public four-year institution. There is no consistent discernible difference in labor market outcomes for students initially attending the various types of institutions. However, when looking at academic outcomes, we find some evidence for mostly negative effects of attending any of the two-year institutions or the private for-profit four-year institutions as compared to a public four-year institution. There is strong evidence indicating that direct enrollment students complete between four and six fewer credits when they choose to attend a private for-profit four-year institution. Looking at the first column of Table 1.13 and Table 1.14, there is small evidence to suggest that students attending a public two-year institution make less progress toward an associate degree than those at a public four-year institution, but this is only significant in a couple of models. Unsurprisingly, there is evidence showing that students attending public and private two-year institutions are generally less likely to make progress toward a bachelor's degree or complete their bachelor's degree than those initially enrolling in a public four-year institution. Those attending a private not-for-profit four-year institution make up to 7.5% more progress toward their bachelor's degree than those at a public four-year institution, and are 6.6-9.2% more likely to actually attain a bachelor's degree. Thus, for students enrolling in postsecondary education directly after high school graduation, institution choice generally does not make a difference in the labor market. However, if the main goal is to complete a bachelor's degree, students would be better served starting off in a private not-for-profit four-year institution, though they are only 6-10% more likely to complete a bachelor's degree than similar students starting at a public four-year institution.

### *Conclusion*

Non-traditional students are an important segment of the postsecondary student population. Higher education is becoming increasingly important in training the labor force and increasing prosperity for Americans. Students who delay enrollment in postsecondary education are at a disadvantage when compared to those who enroll directly after high school. However, some types of institutions make efforts to reach out to these types of students and provide needed program flexibility. Previous studies have looked at educational achievement in terms of bachelor degree completion for gap year students while controlling for some demographic and socioeconomic characteristics. However, it is also important to include elements such as the availability of choices when choosing the type of institution to attend, the local labor market conditions, and high school preparation.

Students' choice of postsecondary institution generally has very little effect on their labor market and academic outcomes. Any effects that these students see by institution type is greatly outweighed by the effect of delaying enrollment in college. Gap year students, regardless of the institution type attended, have lower earnings than direct enrollment students as found in both the Ordinary Least Squares (OLS) and Average Treatment on the Treated (ATT) models. However, the gap year students still have better earnings than those that are never observed enrolling in college. Additionally, both types of models show that gap year students have lower progress toward and lower attainment of associate and bachelor's degrees when compared to direct enrollment students. These are the strongest and most significant effects found in the models.

The different institution types do offer some minor variations in outcomes, though these are mainly isolated to the academic outcomes or the private two-year institutions. When looking at the labor market, direct-to-college students have no

significant difference for any labor market outcome by institution type. Gap year students also find no significant difference for labor market outcomes by institution type with the exception of enrolling in a private two-year institution, which consistently leads to lower wages and earnings compared to a public four-year institution in both the OLS and ATT models.

Academic outcomes show a little more variation by institution type. Direct-to-college students enrolling in two-year institutions, public and private, show lower progress toward and attainment of degrees, particularly bachelor's degrees. Even though two-year institutions may be a less expensive way to get the first two years of college toward a bachelor's degree, the lower likelihood of completing a bachelor's degree might make it a less desirable choice. On the other hand, private not-for-profit four-year institutions show that direct enrollment students are 6.6-9.2% more likely to complete a bachelor's degree than students enrolling at a public four-year institution – though this usually does come with a higher price tag.

As mentioned above, gap year students who enroll in private two-year institutions have lower wages and earnings, but they also show lower credits completed and completion of associate degrees in the OLS models. In both model types, public two-year institutions also show lower credit completion by over 4 credits which equates to a little more than one fewer class. The private for-profit four-year institutions show more progress to associate degrees in the ATT models, but also show potentially lower wages as well. However, all of these differing effects in the labor market and the academic market are fairly small other than the lower wages and earnings from delayed enrollment in a private two-year institution. The lower wages and earnings possibly could be a result of the fields that the students enter after attending these more generally vocationally focused institutions. Principally, attending different types of postsecondary institutions does not have as much effect on

labor market and academic outcomes as does the decision to initially delay enrollment in college. However, if a student does delay enrollment in college, most types of institutions will lead to similar results with the exception of the private two-year institutions.

**Figure 1.1: Flow of choices for high school graduates**

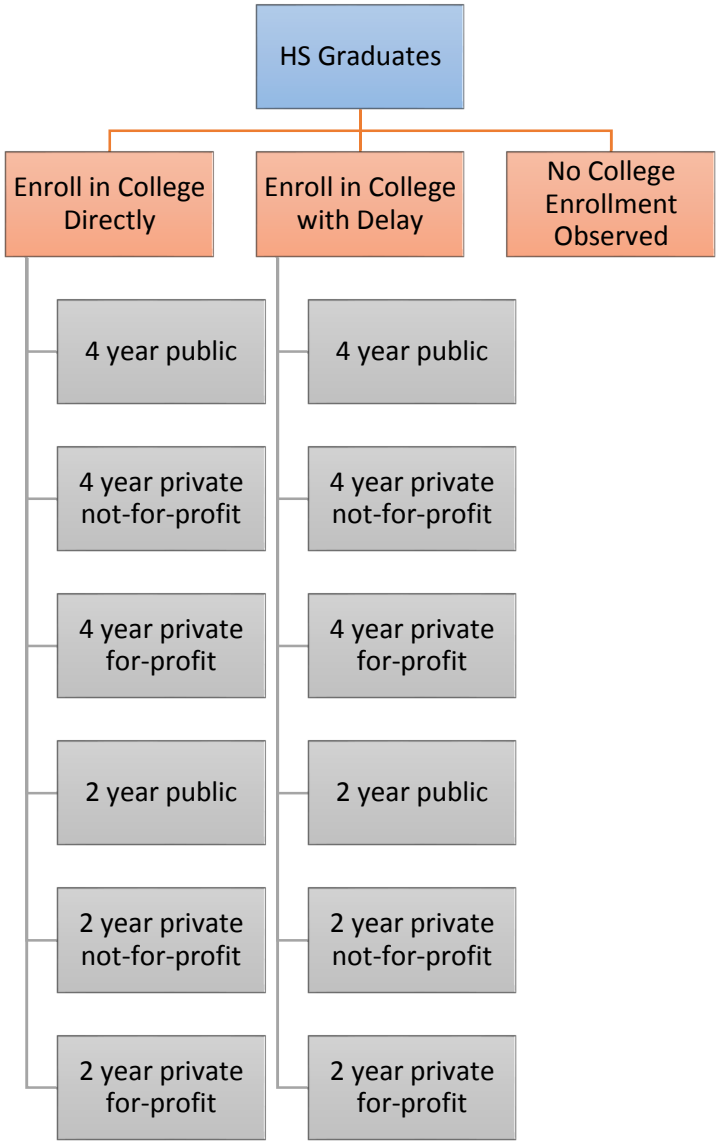


**Table 1.1: Students at each type of institution**

| | Public 4-yr | Private nfp 4-yr | Private fp 4-yr | Public 2-yr | Private nfp 2-yr | Private fp 2-yr | Total |
|---|---|---|---|---|---|---|---|
| Direct to College | 1,635 | 636 | 80 | 1,172 | 10 | 40 | 3,573 |
| Gap Year | 310 | 116 | 154 | 992 | 4 | 75 | 1,651 |
| No College | | | | | | | 2,317 |

**Table 1.2: Students at each type of institution, combined groups**

| | Public 4-yr | Private nfp 4-yr | Private fp 4-yr | Public 2-yr | Private nfp2-yr and fp 2-yr | Total |
|---|---|---|---|---|---|---|
| Direct to College | 1,635 | 636 | 80 | 1,172 | 50 | 3,573 |
| Gap Year | 310 | 116 | 154 | 992 | 79 | 1,651 |
| No College | | | | | | 2,317 |

## Table 1.3: Summary Statistics

| | Direct Entry | Gap Year | No College |
|---|---|---|---|
| Log weekly wage | 6.43 | 6.4 | 6.39 |
| | (0.52) | (0.59) | (0.61) |
| Log weekly earnings | 9.78 | 9.61 | 9.45 |
| | (1.07) | (1.02) | (1.19) |
| Household income at age 25 | 29306 | 26591 | 25605 |
| | (87331) | (72173) | (76792) |
| Credits completed, total | 6.61 | 7.09 | 0.12 |
| | (12.72) | (14.2) | (2.05) |
| Credits completed toward AA | 58.3 | 46.5 | |
| | (36.1) | (35.9) | |
| Credits completed toward BA | 76.8 | 54.9 | |
| | (32.2) | (34.9) | |
| AA Degree Completion | 0.397 | 0.401 | |
| | (0.489) | (0.491) | |
| BA Degree Completion | 0.760 | 0.342 | |
| | (0.427) | (0.475) | |

| | Direct Entry | Gap Year | No College |
|---|---|---|---|
| Unemployment Rate | 3.73 | 3.92 | 3.85 |
| | (1.17) | (1.21) | (1.3) |
| Number of postsecondary inst. | 30.9 | 35 | 28.7 |
| | (54) | (64.2) | (52.4) |
| Average postsecondary tuition | 7531 | 7808 | 8209 |
| | (15162) | (16014) | (18912) |
| Share of 2-year public institutions | 0.215 | 0.208 | 0.228 |
| | (0.247) | (0.237) | (0.266) |
| Share of 4-year public institutions | 0.085 | 0.084 | 0.087 |
| | (0.124) | (0.118) | (0.122) |
| Share of 2-year non-profit private inst. | 0.067 | 0.075 | 0.062 |
| | (0.083) | (0.101) | (0.092) |
| Share of 4-year non-profit private inst. | 0.209 | 0.211 | 0.206 |
| | (0.199) | (0.197) | (0.207) |
| Share of 2-year for-profit private inst. | 0.37 | 0.369 | 0.356 |
| | (0.222) | (0.22) | (0.23) |
| Share of 4-year for-profit private inst. | 0.042 | 0.041 | 0.051 |
| | (0.089) | (0.093) | (0.114) |
| Share of 2-year private institutions | 0.437 | 0.444 | 0.418 |
| | (0.228) | (0.226) | (0.235) |

| | Direct Entry | Gap Year | No College |
|---|---|---|---|
| Months before college | 2.6 | 33.2 | 99.5 |
| | (1.1) | (28.7) | (26.1) |
| Female | 0.552 | 0.515 | 0.404 |
| | (0.497) | (0.500) | (0.491) |
| Black | 0.207 | 0.283 | 0.300 |
| | (0.405) | (0.451) | (0.458) |
| Hispanic | 0.156 | 0.257 | 0.218 |
| | (0.363) | (0.437) | (0.413) |
| Family income percentile (SES) | 62.7 | 49.1 | 42.5 |
| | (27.9) | (28.4) | (26.7) |
| Income Information Missing | 0.254 | 0.271 | 0.267 |
| | (0.436) | (0.445) | (0.442) |
| SAT Math Score | 1.942 | 0.878 | 0.290 |
| | (2.117) | (1.660) | (1.010) |
| SAT Verbal Score | 1.916 | 0.880 | 0.268 |
| | (2.092) | (1.655) | (0.972) |
| ASVAB/1000 | 51.75 | 36.38 | 23.25 |
| | (32.58) | (29.28) | (24.08) |
| Share of HS credits in Science | 0.131 | 0.114 | 0.104 |
| | (0.084) | (0.087) | (0.106) |
| Share of HS credits in Math | 0.146 | 0.136 | 0.129 |
| | (0.088) | (0.104) | (0.125) |
| Share of HS credits in Foreign Lang. | 0.088 | 0.059 | 0.032 |
| | (0.070) | (0.071) | (0.059) |
| HS GPA (out of 4.0) | 2.42 | 1.95 | 1.61 |
| | (1.38) | (1.31) | (1.28) |
| HS Gradation Age (years) | 17.8 | 18.0 | 18.7 |
| | (0.7) | (1.0) | (1.8) |
| GED | 0.021 | 0.123 | 0.283 |
| | (0.144) | (0.329) | (0.451) |
| Father's education | 12.40 | 10.57 | 9.467 |
| | (5.302) | (5.407) | (6.618) |
| Mother's education | 13.10 | 11.7 | 11.05 |
| | (3.732) | (4.071) | (4.76) |
| Married before college | 0.008 | 0.113 | 0.359 |
| | (0.09) | (0.317) | (0.48) |
| Children before college | 0.027 | 0.225 | 0.542 |
| | (0.163) | (0.418) | (0.498) |

## Table 1.4: OLS Regressions, Institution Types, Labor Market Outcomes

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Log wage | Log wage | Log earnings | Log earnings | Household Income at Age 25 | Household Income at Age 25 |
| Gap Year | 0.00494 | 0.0873 | **-0.0929**** | 0.340 | 3119 | -20373 |
| | (0.0227) | (0.250) | (0.0432) | (0.471) | (3714) | (46454) |
| Public 2 Year | 0.00106 | 0.00801 | 0.327*** | 0.305*** | -3248 | -1970 |
| | (0.0256) | (0.0271) | (0.0490) | (0.0517) | (4117) | (4363) |
| Private 2 Year | -0.0198 | 0.000578 | 0.134 | 0.507** | -14047 | -17479 |
| | (0.0675) | (0.105) | (0.130) | (0.198) | (10522) | (16241) |
| Public 4 Year | 0.00619 | -4.62e-05 | 0.344*** | 0.350*** | -1457 | -1978 |
| | (0.0277) | (0.0286) | (0.0530) | (0.0546) | (4478) | (4643) |
| Private NFP 4 Year | 0.00646 | -0.00489 | 0.297*** | 0.351*** | -6216 | -6281 |
| | (0.0350) | (0.0370) | (0.0667) | (0.0704) | (5805) | (6156) |
| Private FP 4 Year | -0.0244 | 0.0225 | 0.479*** | 0.382** | -8549 | -21938* |
| | (0.0516) | (0.0792) | (0.0990) | (0.152) | (8289) | (13282) |
| Gap Year*Public 2 Year | | -0.0984 | | -0.373 | | 20503 |
| | | (0.252) | | (0.475) | | (46706) |
| Gap Year*Private 2 Year | | -0.115 | | **-1.046*** | | 28912 |
| | | (0.283) | | (0.534) | | (50762) |
| Gap Year*Public 4 Year | | -0.0526 | | -0.427 | | 26089 |
| | | (0.254) | | (0.479) | | (47023) |
| Gap Year*Private NFP 4 Year | | -0.0224 | | -0.724 | | 23018 |
| | | (0.260) | | (0.490) | | (47882) |
| Gap Year*Private FP 4 Year | | -0.156 | | -0.276 | | 43191 |
| | | (0.269) | | (0.507) | | (49085) |
| Constant | 7.372*** | 7.371*** | 10.03*** | 10.01*** | 27477 | 28657 |
| | (0.302) | (0.302) | (0.603) | (0.602) | (41461) | (41493) |
| Observations | 4670 | 4670 | 4532 | 4532 | 3675 | 3675 |
| R-squared | 0.019 | 0.020 | 0.082 | 0.085 | 0.020 | 0.021 |

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Controls included for race and gender dummies, household income in HS, HS academic indicators, local UR, number of postsecondary institutions in county, avg tuition of those institutions, and shares of each type of institution available.

## Table 1.5: OLS Regressions, Institution Types, Academic Outcomes

| | (9) Credits Completed | (10) Credits Completed | (11) Progress toward AA | (12) Progress toward AA | (13) Progress toward BA | (14) Progress toward BA | (15) Completed AA Degree | (16) Completed AA Degree | (17) Completed BA Degree | (18) Completed BA Degree |
|---|---|---|---|---|---|---|---|---|---|---|
| Gap Year | 0.6 | **3.3*** ** | **-0.104*** ** | **-0.097*** | **-0.140*** ** | **-0.115*** ** | **-0.0877*** ** | 0.0128 | **-0.205*** ** | **-0.212*** ** |
| | (0.5) | (1.0) | (0.020) | (0.056) | (0.020) | (0.030) | (0.0239) | (0.0652) | (0.0283) | (0.0430) |
| Public 2 Year | -0.7 | 0.7 | -0.027 | -0.019 | -0.067*** | -0.057*** | -0.0270 | 0.00346 | -0.131*** | -0.138*** |
| | (0.5) | (0.6) | (0.027) | (0.032) | (0.019) | (0.021) | (0.0319) | (0.0371) | (0.0268) | (0.0303) |
| Private 2 Year | 0.7 | 3.3 | 0.069 | 0.095 | -0.257*** | -0.332*** | 0.236*** | 0.461*** | -0.265** | -0.249 |
| | (1.5) | (2.5) | (0.061) | (0.090) | (0.084) | (0.108) | (0.0697) | (0.102) | (0.120) | (0.155) |
| Public 4 Year | | | | | | | | | | |
| Private NFP 4 Year | -1.2* | -1.2* | 0.068 | 0.021 | 0.027 | 0.033* | -0.0346 | -0.0438 | 0.0619** | 0.0684** |
| | (0.7) | (0.7) | (0.048) | (0.057) | (0.018) | (0.020) | (0.0563) | (0.0661) | (0.0264) | (0.0280) |
| Private FP 4 Year | -2.6** | -3.7** | 0.105** | 0.060 | -0.047 | -0.045 | 0.195*** | 0.204** | -0.0925 | -0.161* |
| | (1.2) | (1.8) | (0.049) | (0.068) | (0.053) | (0.068) | (0.0566) | (0.0794) | (0.0764) | (0.0973) |
| Gap Year*Public 2 Year | | **-4.5*** ** | | -0.023 | | -0.049 | | -0.111 | | 0.0275 |
| | | (1.2) | | (0.061) | | (0.043) | | (0.0704) | | (0.0619) |
| Gap Year*Private 2 Year | | **-5.9*** | | -0.048 | | 0.170 | | **-0.445*** ** | | -0.0374 |
| | | (3.2) | | (0.125) | | (0.173) | | (0.142) | | (0.248) |
| Gap Year*Public 4 Year | | | | | | | | | | |
| Gap Year*Private NFP 4 Year | | 0.1 | | 0.155 | | -0.055 | | 0.0169 | | -0.0613 |
| | | (1.9) | | (0.108) | | (0.058) | | (0.126) | | (0.0829) |
| Gap Year*Private FP 4 Year | | -0.1 | | 0.078 | | -0.022 | | -0.0711 | | 0.176 |
| | | (2.4) | | (0.101) | | (0.110) | | (0.117) | | (0.158) |
| Constant | 31.7*** | 31.7*** | 0.942** | 0.940** | 0.540* | 0.563* | 0.263 | 0.207 | 0.599 | 0.598 |
| | (8.6) | (8.6) | (0.371) | (0.371) | (0.312) | (0.313) | (0.438) | (0.437) | (0.443) | (0.444) |
| Observations | 3357 | 3357 | 1454 | 1454 | 2071 | 2071 | 1472 | 1472 | 2085 | 2085 |
| R-squared | 0.017 | 0.023 | 0.063 | 0.066 | 0.134 | 0.135 | 0.066 | 0.074 | 0.177 | 0.178 |

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

Controls included for race and gender dummies, household income in HS, HS academic indicators, local unemployment rate, number of postsecondary institutions in county, average tuition of those institutions, and shares of each type of institution available.

## Table 1.6: Model Selection Equation Descriptions

| | | | Model D | | Model F | |
|---|---|---|---|---|---|---|
| **Variables** | **Timing** | **Type** | **Timing** | **Type** | **Timing** | **Type** |
| Black | Probably | Probably | x | x | x | x |
| Hispanic | Probably | Probably | x | x | x | x |
| Female | Probably | Probably | x | x | x | x |
| Household Income | Yes | Yes | x | x | x | x |
| Age at HS Graduation | Yes | Maybe | x | | x | x |
| HS GPA | Yes | Maybe | x | | x | |
| % HS Science Credits | Maybe | Maybe | x | | x | |
| % HS Math Credits | Maybe | Maybe | x | | x | |
| % HS Foreign Language Credits | Maybe | Maybe | x | | x | |
| SAT Math and Verbal scores | Maybe | Yes | | x | | x |
| SAT scores missing | Yes | No | x | | x | |
| ASVAB score | Maybe | Maybe | | | | |
| No. of Institutions | Yes | No | x | | x | |
| Avg. Tuition at Institutions | Yes | No | x | | x | |
| Share of each type of Institution | No | Yes | | x | | x |
| Unemployment Rate | Yes | No | x | | x | |
| Marriage before college | Yes | Maybe | x | x | x | x |
| Marr before college*SES | Yes | Maybe | | | | |
| Children before college | Yes | Maybe | x | x | x | x |
| Child before college*SES | Yes | Maybe | | | | |
| Father's education | Probably | Probably | | | x | x |
| Mother's education | Probably | Probably | | | x | x |

**Table 1.7: Model D ATT from Matching, 3 Main Choices**

| | *l*: No College | | *l*: Direct to College |
|---|---|---|---|
| *m:* | Gap Year | Direct to College | Gap Year |
| Log wages | 0.035 | -0.166 | -0.010 |
| | (0.046) | (0.194) | (0.031) |
| Log earnings | 0.176* | -0.067 | -0.145** |
| | (0.100) | (0.397) | (0.065) |
| Household Income at Age 25 | 1684 | 9204 | 2734 |
| | (7006) | (24877) | (6118) |
| Credit Completion | | | -0.8 |
| | | | (0.8) |
| Progress toward AA degree | | | -0.068** |
| | | | (0.029) |
| Progress toward BA degree | | | -0.113*** |
| | | | (0.031) |
| *Degree Completion:* | | | |
| Associate's (AA) Degree | | | -0.046 |
| | | | (0.033) |
| Bachelor's (BA) Degree | | | -0.216*** |
| | | | (0.042) |

**Table 1.8: Model F ATT from Matching, 3 Main Choices**

| | *l*: No College | | *l*: Direct to College |
|---|---|---|---|
| *m:* | Gap Year | Direct to College | Gap Year |
| Log wages | 0.055 | 0.066 | -0.048 |
| | (0.055) | (0.132) | (0.035) |
| Log earnings | 0.111 | 0.076 | -0.123* |
| | (0.094) | (0.235) | (0.068) |
| Household Income at Age 25 | 2166 | -7898 | 1683 |
| | (6733) | (15737) | (5835) |
| Credit Completion | | | -0.4 |
| | | | (0.8) |
| Progress toward AA degree | | | -0.104*** |
| | | | (0.030) |
| Progress toward BA degree | | | -0.092*** |
| | | | (0.031) |
| *Degree Completion:* | | | |
| Associate's (AA) Degree | | | -0.062* |
| | | | (0.035) |
| Bachelor's (BA) Degree | | | 0.064 |
| | | | (0.040) |

**Table 1.9: Model D ATT from Matching, Timing and Inst. Type as Compared to No College**

**(A)** *l*: No College

*Gap Year*

| *m:* | Public 2 Year | Public 4 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
|---|---|---|---|---|---|
| Log wages | 0.032 | 0.080 | 0.084 | -0.006 | -0.115 |
| | (0.058) | (0.147) | (0.138) | (0.072) | (0.081) |
| Log earnings | 0.231** | -0.112 | -0.575** | -0.185 | 0.462*** |
| | (0.098) | (0.238) | (0.227) | (0.259) | (0.177) |
| Household Income at Age 25 | 3198 | 14468 | -22342 | -6565 | -3539 |
| | (5718) | (10406) | (31558) | (11097) | (12262) |

**(B)** *l*: No College

*Direct to College*

| *m:* | Public 2 Year | Public 4 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
|---|---|---|---|---|---|
| Log wages | -0.020 | -0.087 | -0.074 | 0.160 | 0.087 |
| | (0.100) | (0.251) | (0.288) | (0.188) | (0.155) |
| Log earnings | 0.055 | -0.071 | -0.270 | 0.522 | 0.069 |
| | (0.179) | (0.466) | (0.560) | (0.343) | (0.204) |
| Household Income at Age 25 | 7593 | -8903 | -42323 | -2123 | -26556 |
| | (11551) | (39763) | (55028) | (11378) | (21359) |

**Table 1.10: Model F ATT from Matching, Timing and Inst. Type as Compared to No College**

**(A)** *l*: No College

*Gap Year*

| *m:* | Public 2 Year | Public 4 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
|---|---|---|---|---|---|
| Log wages | 0.029 | 0.016 | 0.050 | -0.144 | -0.097 |
| | (0.054) | (0.123) | (0.116) | (0.117) | (0.094) |
| Log earnings | 0.204** | 0.122 | -0.222 | 0.245 | 0.308 |
| | (0.093) | (0.212) | (0.243) | (0.299) | (0.151) |
| Household Income at Age 25 | 4332 | 13748 | 18156 | -3414 | 10970 |
| | (6023) | (10725) | (22413) | (11931) | (8806) |

**(B)** *l*: No College

*Direct to College*

| *m:* | Public 2 Year | Public 4 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
|---|---|---|---|---|---|
| Log wages | 0.018 | 0.067 | 0.111 | 0.033 | -0.052 |
| | (0.093) | (0.156) | (0.143) | (0.158) | (0.146) |
| Log earnings | 0.001 | 0.150 | 0.137 | 0.365 | 0.220 |
| | (0.181) | (0.276) | (0.349) | (0.316) | (0.262) |
| Household Income at Age 25 | 9929 | -33681 | -20499 | 3079 | -17407 |
| | (10906) | (22781) | (27594) | (7932) | (12196) |

**Table 1.11: Model D ATT from Matching, Gap Year Students, Institution Type as Compared to Public 4-year**

| | *l*: Public 4 Year | | | |
|---|---|---|---|---|
| | *Gap Year* | | | |
| *m:* | Public 2 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
| Log wages | -0.074 | -0.011 | -0.402* | -0.281* |
| | (0.080) | (0.128) | (0.218) | (0.161) |
| Log earnings | -0.141 | -0.435** | -0.925*** | -0.026 |
| | (0.121) | (0.209) | (0.272) | (0.225) |
| Household Income at Age 25 | -20404* | 17429 | 11664 | -4650 |
| | (11854) | (12809) | (12470) | (25293) |
| Credit Completion | -4.4*** | -0.4 | -2.1 | -3.6 |
| | (1.7) | (2.8) | (5.2) | (2.8) |
| Progress toward AA degree | 0.071 | 0.432*** | 0.261** | 0.242** |
| | (0.067) | (0.105) | (0.129) | (0.12) |
| Progress toward BA degree | -0.002 | 0.041 | 0.155 | -0.089 |
| | (0.062) | (0.080) | (0.204) | (0.166) |
| *Degree Completion:* | | | | |
| Associate's (AA) Degree | 0.020 | 0.182 | 0.111 | 0.182 |
| | (0.077) | (0.121) | (0.171) | (0.137) |
| Bachelor's (BA) Degree | -0.053 | 0.085 | 0 | -0.267 |
| | (0.073) | (0.104) | (0) | (0.192) |

**Table 1.12: Model F ATT from Matching, Gap Year Students, Institution Type as Compared to Public 4-year**

| | *l*: Public 4 Year | | | |
|---|---|---|---|---|
| | *Gap Year* | | | |
| *m:* | Public 2 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
| Log wages | -0.050 | 0.208 | -0.334* | -0.145 |
| | (0.078) | (0.165) | (0.198) | (0.127) |
| Log earnings | -0.116 | -0.389 | -0.628** | -0.045 |
| | (0.124) | (0.242) | (0.291) | (0.188) |
| Household Income at Age 25 | -10278 | -5080 | 8169 | 4086 |
| | (12035) | (23255) | (10284) | (22544) |
| Credit Completion | -4.7** | -5.0 | -1.2 | -5.2 |
| | (1.9) | (3.7) | (4.1) | (4.0) |
| Progress toward AA degree | 0.026 | 0.228 | 0.170 | 0.215* |
| | (0.070) | (0.146) | (0.155) | (0.114) |
| Progress toward BA degree | -0.036 | -0.031 | 0.085 | 0.105 |
| | (0.065) | (0.093) | (0.195) | (0.142) |
| *Degree Completion:* | | | | |
| Associate's (AA) Degree | -0.023 | 0 | 0.074 | 0.159 |
| | (0.081) | (0.171) | (0.168) | (0.131) |
| Bachelor's (BA) Degree | -0.073 | 0.191 | -0.167 | -0.067 |
| | (0.076) | (0.12) | (0.167) | (0.159) |

**Table 1.13: Model D ATT from Matching, Direct to College Students, Institution Type as Compared to Public 4-year**

| | *l*: Public 4 Year | | | |
|---|---|---|---|---|
| | *Direct to College* | | | |
| *m:* | Public 2 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
| Log wages | 0.027 | -0.004 | -0.162 | -0.057 |
| | (0.036) | (0.046) | (0.141) | (0.096) |
| Log earnings | -0.025 | 0.005 | 0.139 | -0.073 |
| | (0.080) | (0.086) | (0.287) | (0.221) |
| Household Income at Age 25 | 8597 | 3607 | -35193 | -2248 |
| | (7833) | (8041) | (21703) | (10424) |
| Credit Completion | -0.9 | -0.6 | 5.1 | -6.1** |
| | (1.0) | (0.9) | (4.3) | (2.4) |
| Progress toward AA degree | -0.101** | -0.028 | -0.119 | 0.118 |
| | (0.043) | (0.088) | (0.129) | (0.110) |
| Progress toward BA degree | -0.047 | 0.074*** | -0.307* | -0.078 |
| | (0.031) | (0.027) | (0.162) | (0.095) |
| *Degree Completion:* | | | | |
| Associate's (AA) Degree | -0.009 | -0.019 | 0.150 | 0.200 |
| | (0.055) | (0.102) | (0.172) | (0.129) |
| Bachelor's (BA) Degree | -0.117** | 0.092** | -0.222 | -0.13 |
| | (0.046) | (0.041) | (0.229) | (0.151) |

**Table 1.14: Model F ATT from Matching, Direct to College Students, Institution Type as Compared to Public 4-year**

| | *l*: Public 4 Year | | | |
|---|---|---|---|---|
| | *Direct to College* | | | |
| *m:* | Public 2 Year | Private NFP 4 Year | Private 2 Year | Private FP 4 Year |
| Log wages | 0.039 | -0.008 | 0.007 | 0.200* |
| | (0.036) | (0.044) | (0.104) | (0.104) |
| Log earnings | -0.091 | -0.026 | 0.176 | -0.059 |
| | (0.085) | (0.085) | (0.292) | (0.206) |
| Household Income at Age 25 | 1714 | -1357 | -24553 | -8130 |
| | (7008) | (8864) | (18309) | (12809) |
| Credit Completion | -3.8*** | -0.5 | 6.0 | -3.9** |
| | (1.0) | (0.9) | (4.2) | (1.8) |
| Progress toward AA degree | -0.068 | 0.004 | -0.058 | -0.004 |
| | (0.044) | (0.084) | (0.170) | (0.101) |
| Progress toward BA degree | -0.043 | 0.021 | 0.198 | -0.007 |
| | (0.032) | (0.026) | (0.169) | (0.097) |
| *Degree Completion:* | | | | |
| Associate's (AA) Degree | -0.043 | 0.037 | 0.500*** | 0.086 |
| | (0.055) | (0.104) | (0.151) | (0.126) |
| Bachelor's (BA) Degree | -0.161*** | 0.066* | -0.111 | -0.130 |
| | (0.046) | (0.040) | (0.241) | (0.150) |

# REFERENCES


Bettinger, E. P., Long, B. T., Oreopoulos, P., & Sanbonmatsu, L. (2012). The role of application assistance and information in college decisions: Results from the H&R Block FAFSA experiment. *The Quarterly Journal of Economics*, *127*(3), 1205-1242. doi:10.1093/qje/qjs017

Bozick, R., & DeLuca, S. (2005). Better late than never? Delayed enrollment in the high school to college transition. *Social Forces*, *84*(1), 531-553. doi:10.1353/sof.2005.0089

Cellini, S. (2009). Crowded colleges and college crowd-out: The impact of public subsidies on the two-year college market. *American Economic Journal: Economic Policy, 1*(2), 1-30. doi:10.1257/pol.1.2.1

Cellini, S., & Chaudhary, L. (2014). The labor market returns to a for-profit college education. *Economics of Education Review. 43*, 125-140. doi:10.1016/j.econedurev.2014.10.001

Cellini, S., & Goldin, C. (2014). Does federal student aid raise tuition? New evidence on for-profit colleges. *American Economic Journal: Economic Policy. 6*(4), 174-206. doi:10.1257/pol.6.4.174

Cheslock, J. (2005). Differences between public and private institutions of higher education in the enrollment of transfer students. *Economics of Education Review. 24*(3), 263-274. doi:10.1016/j.econedurev.2004.06.002

Chin, A., & Juin, C. (2011). Does reducing college costs improve educational outcomes for undocumented immigrants: Evidence from state laws permitting undocumented immigrants to pay in-state tuition at state colleges and universities. In D.L. Leal & S.J. Trejo (Eds.), *Latinos and the economy: Integration and impact in schools, labor markets, and beyond* (pp. 63-94). New York: Springer.

Darolia, R., Koedel, C., Martorell, P., Wilson, K., & Perez-Arce, F. (2014). Do employers prefer workers who attend for-profit colleges? Evidence from a field experiment. *Journal of Policy Analysis and Management*, *34*(4), 881-903. doi: 10.1002/pam.21863

Deming, D.J., Goldin, C., & Katz, L.F. (2012). The for-profit postsecondary school sector: Nimble critters or agile predators?. *Journal of Economic Perspectives*, *26*(1), 139-164. doi:10.1257/jep.26.1.139

Deming, D.J., Goldin C., Katz, L.F. & Yuchtman, N. (2015). Can Online Learning Bend the Higher Education Cost Curve?. *American Economic Review, 105*(5), 496-501. doi:10.1257/aer.p20151024

Deming, D.J., Yuchtman, N., Abulafi, A., Goldin, C., & Katz, L.F. (2016). The value of postsecondary credentials in the labor market: An experimental study. *American Economic Review, 106*(3), 778-806. doi: http://dx.doi.org/10.1257/aer.20141757

Desmond, M., & López Turley, R.N. (2009). The role of familism in explaining the Hispanic-white college application gap. *Social Problems*, *56*(2), 311-334. doi:10.1525/sp,2009.56.2.311

Ehrenberg, R.G., & Smith, C.L. (2004). Analyzing the success of transitions from 2- to 4-year institutions within a state. *Economics of Education Review, 23*(1), 11-28. doi:10.1016/S0272-7757(03)00078-5

Featherman, D.L., & Carter, T.M. (1976). Discontinuities in schooling and the socioeconomic life cycle. In W.H. Sewell, R.M. Hauser, & D.L. Featherman (Eds.), *Schooling and Achievement in American Society*. New York: Academic Press.

Gilpin, G., Saunders, J., & Stoddard, C. (2015). Why have for-profit colleges expanded so rapidly? The role of labor market changes in student enrollment

and degree completion at two-year colleges. *Economics of Education Review, 45*(2), 53-63. doi:10.1016/j.econedurev.2014.11.004

Gonzalez, A. & Hilmer, M.J. (2006). The role of two-year colleges in the improving situation of Hispanic postsecondary education. *Economics of Education Review*, *25*(3), 249-257. doi:10.1016/j.econedurev.2004.12.002

Hearn, J.C. (1992). Emerging variations in postsecondary attendance patterns: An investigation of part-time, delayed, and nondegree enrollment. *Research in Higher Education*, *33*(6), 657-687. doi:10.1007/BF00992053

Hilmer, M. (1997). Does community college attendance provide a strategic path to higher quality education. *Economics of Education Review, 16*(1), 59-68. doi:10.1016/S0272-7757(96)00018-0

Imbens, G. W. (2000). The role of the propensity score in estimating dose-response functions. *Biometrika, 87*(3), 706-710. doi:10.1093/biomet/87.3.706

Jacobs, J.A. & Berkowitz King, R. (2002). Age and college completion: A life-history analysis of women aged 15-44. *Sociology of Education, 75*(3), 211-230. doi:10.2307/3090266

Lang, K. & Weinstein, R. (2013).The wage effects of not-for-profit and for-profit certifications: Better data, somewhat different results. *Labour Economics, 24*, 230-243. doi:10.1016/j.labeco.2013.09.001

Lechner, M. (2001). Identification and estimation of causal effects of multiple treatments under the conditional independence assumption. In M. Lechner & F. Pfeiffer (Eds.), *Econometric Evaluations of Active Labor Market Policies in Europe* (pp. 43-58). Heidelberg: Physica-Verl.

Lechner, M. (2002). Program heterogeneity and propensity score matching: An application to the evaluation of active labor market Policies. *Review of Economics & Statistics*, *84*(2), 205-220. doi:10.1162/003465302317411488

Liu, Y.T. & Belfield, C. (2014) The labor market returns to for-profit higher education: Evidence for transfer students (CAPSEE Working Paper). New York: Center for Analysis of Postsecondary Education and Employment. Retrieved August 31, 2015 from http://capseecenter.org/labor-market-returns-to-for-profit-higher-education/

Long, B.T. (2009). Do community colleges provide a viable pathway to a baccalaureate degree. *Educational Evaluation and Policy Analysis, 31*(1), 30-53. doi:10.3102/0162373708327756

National Center for Education Statistics. (2005). *Waiting to attend college: Undergraduates who delay their postsecondary enrollment* (NCES 2005-152). Washington, D.C.: U.S. Department of Education. Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2005152

Nutting, A.W. (2004). *Time-of-transfer and the outcomes of attending a four-year college: evidence from SUNY* (CHERI Working Paper #54). New York: Cornell University. Retrieved August 31, 2015 from http://digitalcommons.ilr.cornell.edu/student/9/

Nutting, A.W. (2005). *Do community college students benefit when transferring with other transfers? A cross-section peer effect analysis* (CHERI Working Paper #66). New York: Cornell University. Retrieved August 31, 2015 from http://digitalcommons.ilr.cornell.edu/cheri/23/

Rouse, C. (1995). Democratization or diversion? The effect of community colleges on educational attainment. *Journal of Business & Economic Statistics*, *13*(2), 217-224. doi:10.2307/1392376

Rouse, C. (1999). Do two-year colleges increase overall educational attainment? Evidence from the states. *Journal of Policy Analysis and Management*, *17*(4), 593-620. doi:10.1002/(SICI)1520-6688(199823)17:4<595::AID-

PAM1>3.0.CO;2-5

Rowan-Kenyon, H.T. (2007). Predictors of delayed college enrollment and the impact of socioeconomic status. *Journal of Higher Education*, *78*(2), 188-214. doi:10.1353/jhe.2007.0012

Sandy, J., Gonzalez, A., & Hilmer, M.J. (2006). Alternative paths to college completion: Effect of attending a 2-year school on the probability of completing a 4-year degree. *Economics of Education Review, 25*(2), 436-471. doi:10.1016/j.econedurev.2005.05.003

The State of the Union Address. (2009). Retrieved May 15, 2013, from http://www.nytimes.com/2009/02/24/us/politics/24obama-text.html?pagewanted=all&_r=0.

Steele, J.L., Salcedo, N., & Coley, J. (2011). Service members in school: Military veterans' experiences using the post-9/11 G.I. bill and pursuing postsecondary education. Santa Monica, CA: RAND Corporation. Retrieved from http://www.rand.org/pubs/monographs/MG1083.

Turley, R.N.L. (2009). College proximity: Mapping access to opportunity. *Sociology of Education*, *82*(2), 126-146.doi: 10.1177/003804070908200202

U.S. Government Accountability Office. (2010). *For-profit colleges: Undercover testing finds colleges encourage fraud and engaged in deceptive and questionable marketing practices* (GAO-10-948T). Washington, D.C.: Author. Retrieved from http://www.gao.gov/products/GAO-10-948T

# CHAPTER 2

# THE GAP YEAR EXPERIENCE: DIFFERENTIATING BETWEEN TYPES OF GAP YEAR STUDENTS

## *Introduction*

Of students that are enrolling in college, a growing number are students who delayed enrolling in college instead of beginning the next semester after high school graduation. As an example, for the 1999-2000 school year, 37 percent of the students enrolled in college had delayed at least one year before enrolling (NCES 2005). This growing number of college students that delay entry leads to several questions about how these students perform in college and afterward, as well as why they delayed enrolling in college instead of entering at the traditional time.

When considering students that delay enrollment into postsecondary education, many reasons or possible scenarios are offered. Students may be delaying college enrollment because they have taken the opportunity to travel the world or engage in a serious service project. This can potentially have positive results on a student's focus and help them have a more definitive plan for their schooling and future. However, students may also be delaying college because they have engaged in a big life transition to adulthood, such as work, marriage, or parenthood. They may choose to enter the workforce before enrolling in college because they tired of school or were poorly prepared academically. Additionally, it may be to earn money to finance college tuition or to provide for their families, existing or newly created. Research on gap year or delayed enrollment students in the United States has consistently shown negative results for the students who delay enrollment. But all of these studies group all students who delay enrollment into one group with the same effect. If students delay enrollment for very different reasons, we might also expect the effect on them to

be different. There may very well be negative results to delaying enrollment because a student is working to earn money to pay for schooling or because they are uncertain about going to college or completing a bachelor's degree. Though the share of students taking a gap year between high school and college in order to travel the world or serve others is growing in the US, they may still be a small share of all delayed enrollment students and any positive result may be diluted in the negative result from students with inadequate funding or poor academic preparation. Thus, earlier studies may have understated the negative returns to delayed enrollment for those students who cannot afford it because of decreasing financial aid or who are poorly prepared to attend. Simultaneously, the studies cannot discern the other type of delayed enrollment student to see if they have a different outcome to delaying enrollment for postsecondary education.

This essay seeks to differentiate between these two types of delayed enrollment students: those who are the marginal student to higher education for financial or academic reasons versus those who delay enrollment for reasons of personal enrichment, social consciousness, or resume improvement. It will attempt to answer the questions: Do these two groups exist? How different are they? How do their outcomes differ? How do their characteristics contribute differently to their outcomes? They will also be looked at in comparison to those students who went to college directly after high school graduation as well as those who we never observe enrolling in college through their late twenties and older.

***Background Studies***

Much of the initial research examining students who delayed enrollment into college has included the influence of observable background characteristics on the likelihood of students to delay enrollment. The first study to look at the effect of delayed entry into college was conducted by Featherman and Carter (1976) using a sample of 340 men from Michigan from the 1939-1940 birth cohort[13]. They found that those who delayed entry into college by at least six months completed less years of schooling than those who entered directly. Additionally, they found that even when they compared those with the same educational attainment, those who entered college directly generally had a more prestigious fulltime position as compared to those who delayed entry or had discontinuous patterns of college attendance. However, when they compared results within an occupation, they found no earnings difference between types of college attendance. Interestingly, they also found that standard socio-demographic characteristics, such as father's occupation and education, mother's education, location in an urban area, and cognitive ability, were unrelated to delaying entry into post-secondary education.

Since that time, however, several studies by sociologists have indicated that this is no longer the case and that several socio-demographic characteristics that indicate financial and academic preparation for college are also indicative of the likelihood to delay enrollment in higher education. For instance, James Hearn (1992) looked at high school seniors in the United States from the class of 1982 in order to analyze how socioeconomic status and other factors were likely to affect the timing of college enrollment. He found that those students who delay college enrollment by a year or more after HS graduation are more likely to be male, come from a low socioeconomic background, and perform poorly on schoolwork and on standardized

[13] Typical high school graduation in 1957 or 1958.

tests. His conclusion was that students delaying enrollment into college were likely doing so because of poor academic preparation or financial restraints. This conclusion is supported by an educational psychology study done with high school and college students in Australia by Andrew Martin (2010). He found that students who had more uncertainty about their plans after high school were more likely to plan on a gap year before college and that poor academic preparation led to much greater uncertainty.

The outcome of interest that most sociologists have focused on as a result of delayed enrollment has been college completion. Bozick and Deluca (2005) use the National Educational Longitudinal Survey of 1988 (NELS88) in order to find the effect of delayed enrollment on college completion even after controlling for background characteristics. They found that even net of background characteristics, students delaying enrollment in college are 67% less likely to complete a college degree. In order to remove the effect of the type of institution attended, they also focused on just those students that attend a four year university and still found negative returns on degree completion to delaying college enrollment. They also introduced the idea that different life events, such as marriage or childbearing, may have a significant influence on college enrollment and completion. They found a negative effect on degree completion when students married or had a child before or during postsecondary education. However, they found no change in the negative effect on degree completion of delaying enrollment to college when they controlled for having a child.

In order to analyze the effect of life events and the socioeconomic status of students, Goldrick-Rab and Han (2011) also used NELS88. Their study focused on explaining the gap in enrollment delay between socioeconomic status (SES) groups. They compared the top 20% SES group to the bottom 20% SES group. They find that students from the bottom 20% are six times more likely to delay college enrollment.

However, once they take into account the differences in academic preparation and early family formation, the gap changes to only two times as likely to delay enrollment. From the paper by Bozick and Deluca, they already knew that delaying college exerts an independent effect on college completion net of family formation, but they also find that family formation is independently associated with the likelihood of delay and contributes to the class gap in delayed enrollment. They further find that effect of family formation is very different in the two SES groups and that having a child before enrolling in college affects the enrollment timing of the top 20% SES group much more than it affects the bottom 20% SES group, though students from the bottom group are much more likely to have a child before enrolling in college.

In addition to controlling for marriage and parenthood when analyzing delay in college enrollment and degree completion, Roksa and Velez (2012) argue that it is important to control for the timing of all of the transitions to adulthood, including the transition to employment. They use the National Longitudinal Survey of Youth of 1997 to create monthly time-varying measures of employment, marriage, and parenthood. Though they find that these transitions into adulthood are much more prevalent among students who delay enrolling in college, they also find that this is not a full explanation of the negative relationship between delayed enrollment and degree completion. Instead, they conclude that the challenge of combining higher education with their other roles as employee, parent, and spouse makes it difficult to balance all of their responsibilities. A higher proportion of students who delay entry are likely to have this struggle to balance everything throughout their postsecondary schooling and that leads to their lower likelihood of degree completion. Though all of these studies analyze the factors that contribute to the likelihood to delay college enrollment and how that affects degree completion, they always focus on gap year students as a collective group. In my study, I will try to differentiate between types of gap year

students and look at their outcomes, both in terms of degree completion and their earnings and wages earned six years after their high school graduation.

***Methodology***

When a student graduates from high school, they face a variety of choices including the decision to enroll at a postsecondary institution. When considering this choice, a student may follow the traditional route and choose to enroll in college the first semester following high school graduation. Alternatively, they may choose not to enroll in college right away. These high school graduates that choose not to enroll in college directly will either enroll eventually or never enroll in college. We only observe the students up to a point and so we only know whether they enroll in college by their late twenties or early thirties. As stated before, most studies group students into three categories: directly enrolling in college, delayed entry to college, or no college. However, the students who delay entry to college are likely to consist of two different types of students, those who delay because they are hesitant about college for financial or academic reasons and those who delay in order to have an enriching experience between high school graduation and college entry.

The different types of delayed enrollment students are likely to be different and react differently to the same or similar observable characteristics.[14] We can describe the outcome equations for these two types of gap year or delayed entry students in the following way[15]:

$$Y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i} \;\; if \; d_i^* < \overline{D} \quad (1)$$
$$Y_{2i} = \beta_2 X_{2i} + \varepsilon_{2i} \;\; if \; d_i^* \geq \overline{D} \quad (2)$$

[14] A study by Goldrick-Rab and Han (2011) supports this idea. They found that the effects of academic courses taken in high school and of family formation on degree completion for students who delay entry to college differ for students from different socioeconomic status groups. Socioeconomic status is likely to be highly correlated with type of delayed enrollment student. We can expect to find different results for each student.

[15] Much of the discussion of this section draws from Maddala (1983, p. 223-226), Lokshin and Sajaia (2004), and Hotchkiss and Pitts (2005).

$Y_i$ is the outcome variable of interest, degree completion or log of earnings or wages seven years after high school graduation. $d_i^*$ is the likelihood of a delayed enrollment student being a type 2 delayed enrollment student, where type 1 is the student who is hesitant to enter postsecondary education and type 2 is the student who is delaying for reasons of personal enrichment. $\overline{D}$ is a threshold point at which a student is determined to be a type 2 delayed enrollment student and is described best by equation 2. $\overline{D}$ and $d_i^*$ are unknown and unobserved directly, but will be determined. A testable result from this model is whether the two equations describing type 1 and type 2 delayed enrollment students are significantly different from each other.

The propensity for a student to be a type 2 delayed enrollment student and to have his outcome determined by equation 2 is defined as:

$$d_i^* = \gamma Z_i + u_i \quad (3)$$

Since $d_i^*$ is unobserved, a dichotomous variable, $d_i$, is defined as follows:

$$d_i = \begin{cases} 1 \; if \; d_i^* \geq \overline{D} \\ 0 \; if \; d_i^* < \overline{D} \end{cases} = \begin{cases} \gamma Z_i - \overline{D} + u_i \geq 0 \\ \gamma Z_i - \overline{D} + u_i < 0 \end{cases} \quad (4)$$

A student's propensity to be a type 2 delayed enrollment student is determined primarily by factors in $Z_i$ that are not expected to influence outcomes for either type of delayed enrollment student. I assume that $\varepsilon_{1i}$, $\varepsilon_{2i}$, and $u_i$ have a trivariate normal distribution, with mean vector zero and covariance matrix

$$\Omega = \begin{bmatrix} \sigma_u^2 & \sigma_{1u} & \sigma_{2u} \\ \sigma_{1u} & \sigma_1^2 & . \\ \sigma_{2u} & . & \sigma_2^2 \end{bmatrix}$$

where $\sigma_1^2$ and $\sigma_2^2$ are variance of the error terms in the outcome equations (1) and (2) and $\sigma_u^2$ is the variance of the error term in the selection equation (3). I assume that $\sigma_u^2$=1 since γ is only estimable up to a scale factor. $\sigma_{1u}$ is the covariance of $u_i$ and $\varepsilon_{1i}$, and $\sigma_{2u}$ is the covariance of $u_i$ and $\varepsilon_{2i}$. Since $Y_{1i}$ and $Y_{2i}$ are never observed simultaneously, the covariance of $\varepsilon_{1i}$ and $\varepsilon_{2i}$ is not defined. The model is identified

by construction through nonlinearities. Given the assumption on the distribution of the error terms, $\varepsilon_{1i}$, $\varepsilon_{2i}$, and $u_i$, the logarithmic likelihood function for the model is

$$\ln L = \sum_i (d_i[\ln\{F(\eta_{1i})\} + \ln\{f(\varepsilon_{1i}/\sigma_1)/\sigma_1\}] + (1 - d_i)[\ln\{1 - F(\eta_{2i})\} + \ln\{f(\varepsilon_{2i}/\sigma_2)/\sigma_2\}]) \quad (5)$$

where $F$ is a cumulative normal distribution function, $f$ is a normal density distribution function, and

$$\eta_{1i} = \frac{\left[(\gamma Z_i - \bar{D}) + \rho_j \varepsilon_{ji}/\sigma_j\right]}{\sqrt{1 - \rho_j^2}} \quad \text{for } j = 1, 2$$

where $\rho_1 = \sigma_{1u}^2/\sigma_u\sigma_1$ is the correlation coefficient between $\varepsilon_{1i}$ and $u_i$ and $\rho_2 = \sigma_{2u}^2/\sigma_u\sigma_2$ is the correlation coefficient between $\varepsilon_{2i}$ and $u_i$. It is important that estimated $\widehat{\sigma_1}$ and $\widehat{\sigma_2}$ are always positive and that $\widehat{\rho_1}$ and $\widehat{\rho_2}$ are bounded between -1 and 1. Thus, the maximum likelihood will directly estimate $ln\ \sigma_1$, $ln\ \sigma_2$, and atanh $\rho_j$:

$$\text{atanh}\,\rho_j = \frac{1}{2} ln\left(\frac{1 + \rho_j}{1 - \rho_j}\right) \quad \text{for } j = 1, 2$$

in order to make sure that the above restrictions are met. When the results are reported later on, however, it will report the estimates of $\widehat{\sigma_1}$, $\widehat{\sigma_2}$, $\widehat{\rho_1}$, and $\widehat{\rho_2}$.

In order to find the dichotomous variable $d_i$, a reasonable estimate of $d_i^*$ is needed. As mentioned above, $d_i^*$ is the likelihood of delayed enrollment student *i* to be a type 2 delayed enrollment student. Given that we do not observe $d_i^*$ directly, it must be determined from the data. A type 2 delayed enrollment student is likely to be very similar to the students that enroll directly in college. It is likely that most of them would have enrolled directly in college if not given the opportunity for a personal enriching experience. Alternatively, a type 1 delayed enrollment student is likely to be very similar to the high school graduates that we never observe going to college. This is particularly likely because the type 1 delayed enrollment students were observationally similar to them before they actually enrolled in college. Following this reasoning, I will determine the likelihood of a delayed enrollment student being a

type 2 delayed enrollment student by using the estimated coefficients of the following equation:

$$I_i = \alpha W_i \quad + \varepsilon_{Zi} \quad (6)$$

where $I_i$ equals 0 for high school graduates that are never observed enrolling in college and equals 1 for students who directly enroll in college following high school graduation. The most important identifying variables found in $W_i$ are if a student gets married or has a child before enrolling in college, the student's percentile of socioeconomic status[16], and the student's score on the *Armed Services Vocational Aptitude Battery* (ASVAB) divided by 1000. Also included in $W_i$ are gender and race characteristics and academic performance in high school, as reflected through high school GPA, SAT scores, and the share of classes taken in math, science, and foreign languages. Using a logit model to estimate the above equation, I can find $\hat{\alpha}$ which is then used to calculate $\hat{d}_i$ for each of the delayed enrollment students, where

$$\hat{d}_i = \hat{\alpha} W_i$$

The resulting distribution of the likelihood of being a type 2 delayed enrollment student for all of the delayed enrollment students is shown in Figure 1.

The logarithmic likelihood function, equation (5), depends on a known value of $\overline{D}$. The threshold $\overline{D}$ is unknown but will be determined. I can use maximum likelihood estimation to now determine the parameters of the wage equations for each possible choice of threshold, $\overline{D}$=[0.01,0.99]. The threshold that is used in the end is the $\overline{D}$ associated with the highest, or maximum, value of the maximum likelihood estimator. Using this $\overline{D}$, I then obtain the parameters for each type of delayed enrollment student. I can then implement tests, like the likelihood ratio test, to examine whether the parameters of the two equations are actually different and should

[16] The socioeconomic status percentile used here is found by ranking all of the children in the first round of the NLSY97 survey by household income and assigning each student their percentile rank from 1 to 100.

be estimated separately. If they are, this is evidence that the two types of delayed enrollment students actually exist and can be differentiated into two different groups described by two different outcome equations.

### *Data Description*

The data used for this analysis comes from the National Longitudinal Survey of Youth 1997 (NLSY97), part of the National Longitudinal Surveys (NLS) program. This longitudinal survey follows a sample of 8,984 individuals initially interviewed in round 1, which occurred in 1997. These individuals were born between 1980 and 1984 and ranged in age from 12 to 18 at the time of the first interview. Rounds of interviews have continued annually and data is available through round 13, administered in 2009-2010. Thus, the respondents were aged 24 to 30 at the time of their round 13 interview. Approximately 84 percent of the round 1 sample were interviewed in round 13. The NLSY97 cohort consists of two subsamples, a cross-sectional sample designed to be representative of the US population born during the same time period and a supplemental sample designed to oversample Hispanic or Latino and black people living in the US and also born during the same time period. The survey gathered information on topics such as labor market behavior; education experiences in high school, college, and training; family background; family life; health issues; and income.

The sample is limited to those students who graduated from high school or received a GED, leaving 7,615 high school graduates. These high school graduates are also categorized into three groups: those students enrolling in college within six months of graduating high school or receiving their GED; those students delaying enrollment into college for more than six months after graduating high school or receiving their GED, thus putting them at least one semester off track with their

cohort; and those high school graduates that are not observed enrolling in college thru round 13 of the survey (aged 24-30 or six to twelve years after the traditional age of graduating from high school). There are 3,610 students enrolling directly in college after high school graduation as compared to the 1,688 students who delay enrollment. Finally, there are 2,317 high school graduates that are not observed enrolling in college. The sample means for the full sample and each of these groups are presented in Table 2.1.

The survey contains data on school enrollment during each month from 1997 to the last published round of the survey, which is 2012 in this dataset. The month of college entry was determined as the first month a student reported being enrolled in a two year or four year institution after high school graduation or receipt of their GED. Thus, attendance at an institution of higher education for work on a GED was not counted as enrolling in college. Only once they had received their GED, were they eligible for college enrollment. The number of months between high school graduation and college enrollment was determined by subtracting the month of high school graduation (or GED receipt – in the future, assume to be included with the timing of high school graduation) from the month of college enrollment. As shown in the summary statistics table, those students enrolling directly into college enrolled an average of 2.6 months after high school graduation. This is not surprising, since by construct these students enrolled in college within six months of high school graduation. By contrast, students delaying college enrollment delayed enrollment by an average of 33.2 months after high school graduation. High school graduates not observed enrolling in college show an average of 99.5 months after high school graduation in which they have not enrolled in college.

The variables on basic demographic characteristics were created in the following ways. There are dummy variables for gender, black, and Hispanic. The few

students labeled as non-Hispanic mixed race (72 students) were grouped with the white students. The socioeconomic status percentile variable was created from the full sample of 8,984 students originally interviewed in 1997, weighted to be a representative sample. It ranks the students on the household income of their families in 1997 and each student is assigned a percentile based on their rank. The student's age at high school graduation is calculated for both month and year by subtracting the month of their birth date from the month of high school graduation. Their high school GPA is their typical high school GPA on a 4.00 scale multiplied by 100[17]. Additionally, most students have information on their academic preparation through the share of credits they took in high school in the areas of math, science, and foreign languages. The students also took the *Armed Services Vocational Aptitude Battery* (ASVAB) and their performance on the exam is available for 81% of the high school graduates.

The outcome variables used are the natural log of earnings, natural log of wages, household income at age 25, progress towards a degree, and successful degree completion. Outcomes on earnings and wages are evaluated during the year six years after high school graduation. The natural log of earnings used is the natural log of the total wages and salary earned during that year. The natural log of wages is the natural log of the wage earned at the individual's primary job. Household income is evaluated during the year when the student turned 25 years old. Progress towards a degree measures the share of credits completed toward the goal degree, either an associate or a bachelor's degree, by six years after initial college enrollment. Degree completion is measured looking at completion of an associate degree or a bachelor's degree by six years after initial college enrollment if a degree was attempted.

[17] A small number of students (15) have GPAs that are above 4.00 from accelerated classes that are given more weight. However, no GPA is higher than 4.17.

***Discussion of Results***

As described in the Methodology section, Figure 2.1 depicts the probabilities for each gap year student to be type 2 or those most similar to the students enrolling directly in college. The next step is to determine a threshold, $\overline{D}$, where the students with a probability above the threshold are considered type 2 gap year students and the students below the threshold are type 1 gap year students. As mentioned earlier, we find $\overline{D}$ by choosing the value of the threshold that corresponds with the maximum value of the maximum likelihood estimator from the log likelihood function, equation (5), for each of the potential thresholds. This needs to be done for each outcome or *y* variable. Figure 2.2 graphs the values of the maximum likelihood estimator for the natural log of earnings outcome with the corresponding values of $\overline{D}$. For the switching regression model, it is not unusual to have the actual maximum values of the estimator occur at either extreme value for the threshold. All of the outcomes analyzed in this essay showed a graph similar to this Figure 2.2. The ones that did not follow this pattern were also the outcomes that did not work as well because they had a much smaller sample size. Each of the outcomes has an associated graph and you can find those graphs in the appendix. These graphs indicate that that the highest value of the maximum likelihood estimator is found at a lowest threshold for which the model will run, or very close to it in a few cases. This shows that this group of gap year students with probabilities below 0.01-0.03 are very different than the rest of the gap year students. Table 2.3 shows the results of the switching regression model for the natural log of earnings with a threshold of $\overline{D}$=0.01 and is discussed in greater detail below. However, the students above this low threshold are still not likely to be the type 2 gap year students we are looking to discover since we suspect there are not many of them. The values of the maximum likelihood estimator start to increase again as we approach thresholds above 0.9. I have also looked at the switching regression model

for these high thresholds between 0.97 and 0.98 that correspond to the highest values of the maximum likelihood estimator on the right side as shown in Figure 2.2. The gap year students above this much higher threshold are much more likely to be type 2 gap year students. Table 2.4, discussed in more detail below, shows the different results from the switching regression model for the natural log of earnings with a threshold of $\overline{D}$=0.97.

Summary statistics for the variables included in the outcome equations (1) and (2) and the selection equation are found in Table 2.2 for each of the two types of gap year students by threshold level $\overline{D}$=0.01 and $\overline{D}$=0.98. The variables included in the all of the outcome equations were the gender and race demographics, the age at high school graduation, the socioeconomic status percentile, and their ASVAB score divided by 1000. Also included in the earnings and wage equations was their college entry age as measured in years. This could be considered as a measure of experience in the types of jobs available to high school graduates. The other variable included in the earnings and wage equations was whether they had an associate or bachelor's degree by 6 years after high school graduation since the outcomes are viewed 6 years after high school graduation. For the household income at age 25 outcome equation, a dummy variable indicating completion of an associate or bachelor's degree by age 25 was included. The academic outcomes of progress toward and completion of an associate or bachelor's degree by 6 years after college entry included a student's high school GPA as a measure of ability and previous academic performance. Though the various thresholds vary slightly between outcomes, the summary statistics do not change dramatically between low threshold and low threshold or between high threshold and high threshold. However, the summary statistics associated with threshold levels other than 0.01 and 0.98 can be found in the appendix. In simply comparing the summary statistics of type 1 and type 2 gap year students at the low

threshold and the high threshold, the differences between the two groups appear more significant and more like what we would expect for a type 2 gap year student when using the high threshold. Also, we would expect a smaller number of type 2 gap year students as their characteristics would be overwhelmed in the averages on the data as a whole.

The selection equation (3) always includes all of the exogenous variables in the outcome equations (1) and (2) and may also include other variables as instruments. If no instrumental variables are included, the model is identified only by nonlinearities. In this essay, several other variables were included such as the number of hours worked at five months after high school graduation, father's and mother's years of education, and if the student was married or had a child before enrolling in college for the first time. Five months after high school graduation was the time period chosen in order to avoid capturing those students who are working many hours during the summer before enrolling in college during the fall semester. Additionally, the variable describing the number of hours worked five months after high school graduation was broken up into categorical values: zero to ten hours, ten to twenty hours, twenty to thirty hours, thirty to forty hours, forty to sixty hours, and more than sixty hours.

Evaluating the log likelihood function at the determined threshold $\overline{D}$ gives estimates for $\widehat{\sigma_1}$, $\widehat{\sigma_2}$, $\widehat{\rho_1}$, and $\widehat{\rho_2}$ as well as the parameters for the outcome equations (1) and (2) and the selection equation (3). As a reminder $\widehat{\sigma_1}$ and $\widehat{\sigma_2}$ are the square roots of the variances of the residuals of the regression part of the model (equations (1) and (2)) while $\widehat{\rho_1}$ and $\widehat{\rho_2}$ are the correlation coefficients between the selection equation and each of the outcome equations. The first consideration is whether the sample of gap year students can actually split into two distinct groups or if they should all be lumped together. A likelihood ratio (LR) test for joint independence of the three equations was performed after evaluating the log likelihood function for each of the outcomes.

The LR test was used in order to determine if the parameters for the two outcome equations (1) and (2) are different enough that the two groups can be estimated separately. The LR test reported at the one percent level that the equations were different for almost all of the outcome variables. The only exception is completion of an associate or bachelor's degree within six years of college entry when using the high threshold $\overline{D}$=0.98; the LR test reports that the groups are not different enough to estimate them separately.

Looking at the natural log of earnings outcome, Table 2.3 reports estimates of the parameters for the equations and $\widehat{\sigma_1}$, $\widehat{\sigma_2}$, $\widehat{\rho_1}$, and $\widehat{\rho_2}$ when the threshold $\overline{D}$=0.01. In this estimation, we see that $\widehat{\rho_1}$ is positive and statistically significant which means that the designated type 1 gap year students have lower earnings than a random individual from the sample would have had. Since $\widehat{\rho_2}$ is positive and statistically significant, that means that the designated type 2 gap year students have higher earnings than a random individual from the sample would have had. Both outcome equations in Table 2.3 indicate that female gap year students have lower earnings at six years after high school graduation, but the type 1 female gap year students have much lower earnings. The Hispanic type 2 gap year students in this estimation have higher earnings while the black type 2 gap year students have a little lower earnings. The type 1 gap year students do not show any noticeable advantage to a higher income background while the type 2 gap year students do. The type 1 gap year students also do not show statistically significant returns on earnings to having an associate or bachelor's degree, perhaps because of their lower numbers, but the type 2 gap year students show a 16.8% positive return on earnings.

On the other hand, Table 2.4 looks at the same outcome of the natural log of earnings six years after high school graduation, but with a threshold $\overline{D}$=0.97, which is likely closer to the type of split we would expect to see with type 2 gap year students.

In this case, $\widehat{\rho_1}$ is positive and significantly different from zero, which suggests that the designated type 1 gap year students have lower earnings than a random individual from the sample would have had. The lack of significance for $\widehat{\rho_2}$ in turn suggests that the designated type 2 gap year students do no better or worse than a random individual. In looking at the variables included in the outcome equations, few of them are significant for the type 2 gap year students. This is likely because many of these variables are often more favorable for this group with a smaller variance. However, for the type 1 gap year students, coming from a higher income background, performing better on the ASVAB, or completing an associate or bachelor's degree by 6 years after high school graduation are characteristics that are more likely to stand out and lead to higher returns on earnings. Considering gender differences in outcomes, female type 1 gap year students have much lower earnings while female type 2 gap year students show no difference in earnings from males. In comparing with the low threshold, Hispanic type 1 gap year students are now the ones earning much more. This indicates that there are some Hispanic gap year students with probabilities in the middle range that have much higher earnings. Graduating from high school at older ages indicates lower earnings for type 2 gap year students, while enrolling in college for the first time at an older age will indicate lower earnings for type 1 gap year students. Here, whether the variables are significant or not, the differences between the two equations appear more pronounced as compared to Table 2.3, likely because of the greater differences in the two groups of students. These groups were not chosen, but came as a result of the way it was split by the switching regression model through choosing the threshold on the right side with the highest value for the maximum likelihood estimator.

Table 2.5 presents the estimates from the low threshold on the outcome of the natural log of wages six years after high school graduation. The results are generally

pretty similar to Table 2.3 on earnings, except that the magnitudes of the gender and race coefficients in the outcome variables are not as large. Additionally, type 2 gap year students receive higher wages at their primary job if they were older when they graduated. Type 1 gap year students have higher wages if they perform better on the ASVAB. As with earnings, type 2 gap year students have a positive return on wages of 14.7% if they complete an associate or bachelor's degree by this time, but type 1 gap year students have a very high return on wages if they do so. Less than 4% of the type 1 gap year students complete an associate or bachelor's degree by this time so this result may be magnified by the exceptional achievements of just a few students in comparison to many of the type 1 gap year students and their lower wages. Neither $\widehat{\rho_1}$ nor $\widehat{\rho_2}$ are significantly different than zero, implying that wages in either group are no better or worse than the wages of a random individual from the sample.

At the high threshold of $\overline{D}$=0.98 for the outcome of the natural log of wages, the results in Table 2.6 are quite similar to the results for the natural log of earnings in Table 2.4. None of the variables for the type 2 gap year students are significant while the same variables for the type 1 gap year students are significant in the same direction and with a similar magnitude mostly. An additional variable is significant for natural log of wages as it was for Table 2.5; this is the positive return to wages of graduating from high school a year older, but for type 1 gap year students this time. Also similar to Table 2.5 is the lack of significance for $\widehat{\rho_1}$ and $\widehat{\rho_2}$, meaning that the wages earned by type 1 and type 2 gap year students are no better or worse than the wages earned by a random individual.

Switching the focus to the household income gap students receive at age 25, Table 2.7 has a threshold at $\overline{D}$=0.01. Here, the type 1 gap year students show a significant increase in household income by having an associate or bachelor's degree by age 25, but only two of the students in that group have a degree by age 25 and it

likely comes from the extremely high household income of just one of them. The type 2 gap year students show a negative return on household income at age 25 for graduating a year older. This makes sense because they have less time between high school graduation and age 25 to focus on increasing their household income. The type 2 gap year students also show that coming from a background with higher income means that they are more likely to have a higher income by age 25, which we would expect. Again, in this estimation, $\widehat{\rho_1}$ and $\widehat{\rho_2}$ have no significance so neither group of gap year students is likely to have a higher or lower income by age 25 than a random gap year student chosen from the sample.

Table 2.8 also looks at household income by age 25 for gap year students, but uses the high threshold $\overline{D}$=0.98 to split the students. The type 1 gap year students show the negative effect on household income at age 25 by graduating from high school at an older age as well as the positive effect of coming from a higher income background. In the group of type 2 gap year students, female students and black students have significantly lower household incomes by age 25. Poorer performance on the ASVAB also indicates that your household income at age 25 would be higher in this group by $4 for every point decrease in performance. Returns to completing an associate or bachelor's degree by age 25 are different between the type 1 and type 2 gap year students. The type 1 gap year students still show a positive return to completing an undergraduate degree, though not as large in magnitude as Table 2.7 indicated. However, the type 2 gap year students show a statistically significant negative return to completing an undergraduate degree by age 25. This is difficult to explain as there are several high income individuals that receive a degree as well as those that do not, though percentagewise among type 2 gap year students there is a slightly bigger share of high income individuals among those that did not receive a degree than among those that did receive a degree. In this estimation, we have an

estimated $\widehat{\rho_2}$ that is negative and significantly different from zero, which suggests that the type 2 gap year students have lower household income at age 25 than a random individual from the sample would have had. Considering the outcome equations, this makes sense as the outcome equation for type 2 gap year students has several statistically significant negative coefficients for its variables. It could be that these students are using up more resources during those years or go on to further schooling, thus limiting their income level at those younger years.

This essay analyzes academic outcomes as well for the high and low thresholds starting with progress toward an associate or bachelor's degree by six years after initial college enrollment. Table 2.9 looks at the outcome and selection equations for this outcome when the splitting threshold is at $\overline{D}$=0.03. The estimates for $\widehat{\rho_1}$ and $\widehat{\rho_2}$ are considered to have no significance because the confidence interval for both of these values stretches from -1 to 1, which is the entire range of possible values to calculate for these parameters. They appear to be very close to -1, but we cannot rely on that with the nonlinear estimation and the broad range for the confidence interval. The likelihood ratio test did show two different outcome equations for this estimation though almost none of the variables were statistically significant. Only the high school grade point average (GPA) was significant for the type 2 gap year students and showed an increase in progress toward completing a degree if the student had a higher GPA in high school.

In contrast, the results for the model with a high threshold of $\overline{D}$=0.98 on the outcome of progress toward completing an undergraduate degree has much more normal results, as shown in Table 2.10. The estimates for $\widehat{\rho_1}$ and $\widehat{\rho_2}$, though not significantly different from zero, still fall within the normal range. For both of the outcome equations, the age at which the student graduated high school matters as well as the high school GPA. If a type 2 gap year student is a year older when he

graduates, then he will make more progress toward a degree while a type 1 gap year student that is a year older will make a little less progress toward an undergraduate degree. However, if the student had a higher GPA in high school, he will make more progress toward an associate or bachelor's degree though the type 2 gap year students make more than twice as much progress as type 1 gap year students for each 1 point increase in GPA.

The model has not worked as distinctly for the academic outcomes and this is more apparent looking at the outcome of actual completion of an associate or bachelor's degree by six years after initial enrollment in college. The likelihood ratio test performed on the estimated model at the low threshold of at $\overline{D}$=0.03 shown in Table 2.11 indicates that the equations are independent only at the 6% level. The estimates for $\widehat{\rho_1}$ and $\widehat{\rho_2}$ appear normal, though not statistically significant. Only the outcome equation for type 2 gap year students shows statistically significant variables, though they have the expected signs. Those who graduate a year older from high school are less likely to complete an undergraduate degree among the type 2 gap year students. Those that performed well in high school as shown by their high school GPA are more likely to complete a degree as are those that performed well on the ASVAB and come from a family with a higher income.

The outcome equations for Table 2.12 show similar effects for the type 1 gap year student variables at the higher threshold of $\overline{D}$=0.98 as the type 2 gap year student variables from Table 2.10. There is a lower probability of completing an undergraduate degree within six years of initial college enrollment if a student graduates high school a year older and a higher probability of completion if they come from a wealthier background or had a higher high school GPA. The type 2 gap year students only reflect the importance of a higher high school GPA on the likelihood of completing a college degree. Also similar to Table 2.12, the estimates for $\widehat{\rho_1}$ and $\widehat{\rho_2}$

are not significantly different from zero. However, the likelihood test for this estimated model indicates that these equations are not linearly independent and we cannot really consider the two groups of gap year students as different, at least not when split at this threshold. The model appears not to work as well for the academic outcomes.

***Conclusion***

This essay employs the switching regression model to differentiate between two types of delayed enrollment status: those who delay enrollment for reasons of financial insecurity or academic uncertainty (type 1) versus those who delay enrollment for reasons of personal enrichment, social consciousness, or resume improvement (type 2). The evidence presented in this essay indicates that gap year students can be split into two different groups and are different enough from each other in terms of outcomes and the mechanisms to achieve those outcomes.

The model strongly suggests the idea that among the gap year students there is a lower level group that is very similar to students never observed enrolling in college and that are very different from all of the other gap year students. It was at very low threshold values of the probability to be a type 2 gap year student that resulted in the highest values for the maximum likelihood estimator. The estimates for the outcome equations at this threshold generally appear as we might expect, particularly for the labor market outcomes.

However, there is also evidence to suggest that there might exist another grouping at the high end of probabilities with the gap year students most like those who directly enroll in college. If the other very low group did not exist, it is possible that the high threshold would have been associated with the highest values for the maximum likelihood estimator. Most of the likelihood ratio tests concurred that the

gap year students could be divided into two groups at the high threshold level. The only one that did not was one that had a little trouble splitting the group at the low threshold level as well. Additionally, the predicted results for these high threshold type 2 gap year students appear fairly similar to the results of students that directly enroll in college, at least for the monetary outcomes. For example, average earnings at six years after high school graduation for type 2 gap year students are $24,494 while average earnings for direct-to-college students are $25,329.60 and are not statistically different from each other. For a true type 2 gap year student as described above, there are likely not many students of this type in the United States given that many students take time to travel abroad in the middle of their postsecondary schooling rather than before enrolling in college unlike some other countries. The split at the high threshold has numbers more in keeping with that. Finally, as shown in Table 2.2, the summary characteristics of the two groups with the low threshold are only a little different while the characteristics are very different when the two groups are split at the high threshold level and are more in keeping with what we would expect those differences to be.

The model, with the current choice of variables, appears to work well with labor market outcomes such as earnings, wages, and household income, but not as well with the academic outcomes of degree progress and completion. The challenge is to find good variables that are indicative of academic success that will also provide information for most of the gap year students. The other challenge with this model is that because it works with nonlinearities, it is better to have a larger number of individuals to work with. The data set available had at most 1358 gap year students available for estimations and some had as few as 800 available. As a result, sometimes the model could not run when the group was split using thresholds in the middle of the range and worked best near the ends where the characteristics of the

students were much more polarizing. With access to a better dataset, this research could be replicated in the future with more conclusive results. This essay shows that gap year students can be split into two groups, definitely at a low threshold value and also possibly at a high threshold value. There may very well exist a small group of the gap year students that delay college enrollment after high school entry without also receiving the negative consequences in the labor market and academic performance that most gap year students receive.

**Figure 2.1: Distribution of Probability of Being a Type 2 Gap Year Student**

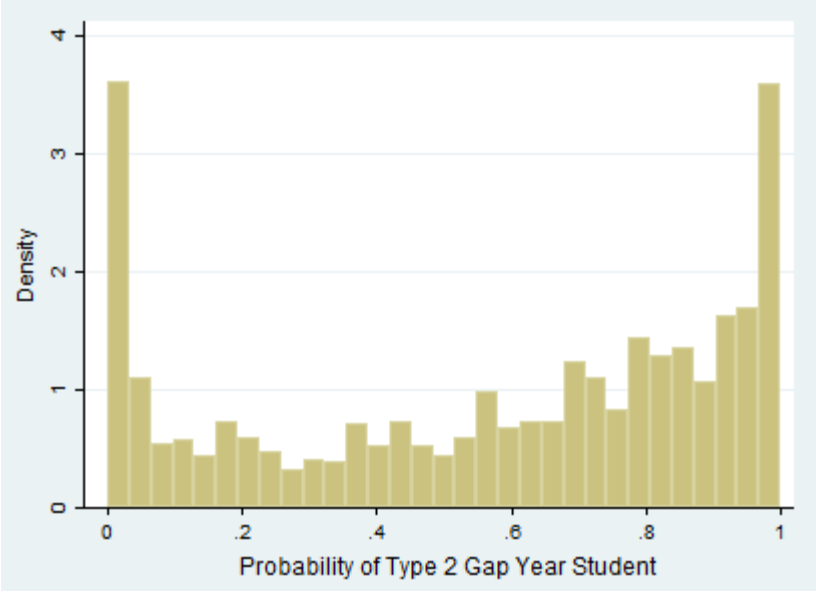
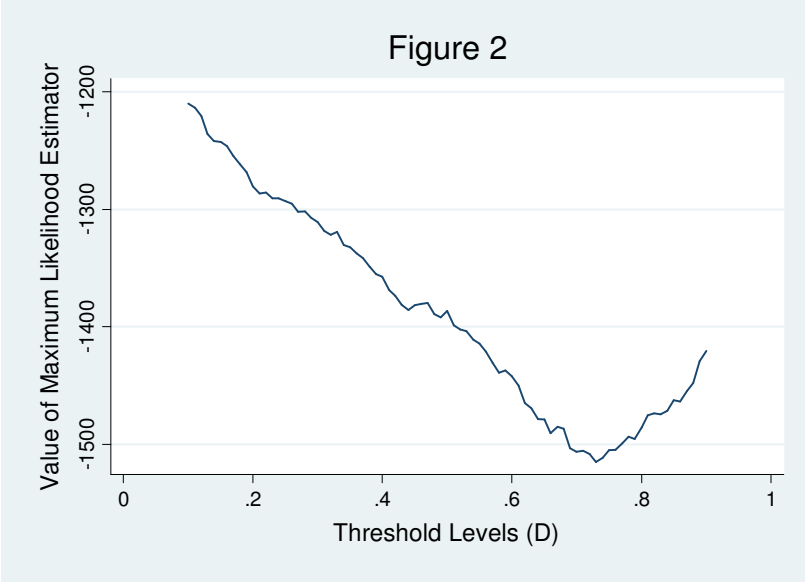



**Figure 2.2: Log Earnings: Values of Maximum Likelihood Estimator at each Threshold Level**



## Table 2.1: Summary Statistics

| | Direct Entry | Gap Year | No College | | Direct Entry | Gap Year | No College |
|---|---|---|---|---|---|---|---|
| Months before college | 2.6 | 33.2 | 99.5 | Female | 0.552 | 0.515 | 0.404 |
| | (1.1) | (28.7) | (26.1) | | (0.497) | (0.500) | (0.491) |
| HS Gradation Age (years) | 17.8 | 18.0 | 18.7 | Black | 0.207 | 0.283 | 0.300 |
| | (0.7) | (1.0) | (1.8) | | (0.405) | (0.451) | (0.458) |
| Credits completed toward AA | 58.3 | 46.5 | 44.4 | Hispanic | 0.156 | 0.257 | 0.218 |
| | (36.1) | (35.9) | (40.3) | | (0.363) | (0.437) | (0.413) |
| Credits completed toward BA | 76.8 | 54.9 | 30.7 | SAT Math Score | 1.942 | 0.878 | 0.290 |
| | (32.2) | (34.9) | (53.1) | | (2.117) | (1.660) | (1.010) |
| AA Degree Completion | 0.397 | 0.401 | 0.020 | SAT Verbal Score | 1.916 | 0.880 | 0.268 |
| | (0.489) | (0.491) | (0.141) | | (2.092) | (1.655) | (0.972) |
| Technical Certificate Completion | 0.024 | 0.120 | 0.329 | ASVAB/1000 | 51.75 | 36.38 | 23.25 |
| | (0.154) | (0.326) | (0.473) | | (32.58) | (29.28) | (24.08) |
| BA Degree Completion | 0.760 | 0.342 | 0 | Share of HS credits in Science | 0.131 | 0.114 | 0.104 |
| | (0.427) | (0.475) | 0 | | (0.084) | (0.087) | (0.106) |
| Professional Degree Completion | 0.002 | 0.005 | 0.020 | Share of HS credits in Math | 0.146 | 0.136 | 0.129 |
| | (0.044) | (0.072) | (0.141) | | (0.088) | (0.104) | (0.125) |
| GED | 0.021 | 0.123 | 0.283 | Share of HS credits in Foreign Lang. | 0.088 | 0.059 | 0.032 |
| | (0.144) | (0.329) | (0.451) | | (0.070) | (0.071) | (0.059) |
| Income percentile (SES) | 62.7 | 49.1 | 42.5 | HS GPA (out of 4.0) | 2.42 | 1.95 | 1.61 |
| | (27.9) | (28.4) | (26.7) | | (1.38) | (1.31) | (1.28) |
| Income Information Missing | 0.254 | 0.271 | 0.267 | Hrs worked 5 mths post HS grad | | | |
| | (0.436) | (0.445) | (0.442) | Hours worked: 0-10 hrs | 0.558 | 0.386 | 0.357 |
| Married before college enrollment | 0.008 | 0.116 | 0.337 | | (0.497) | (0.487) | (0.479) |
| | (0.091) | (0.320) | (0.473) | Hours worked: 10-20 hrs | 0.156 | 0.104 | 0.060 |
| Child before college enrollment | 0.027 | 0.227 | 0.541 | | (0.363) | (0.305) | (0.237) |
| | (0.161) | (0.419) | (0.498) | Hours worked: 20-30 hrs | 0.126 | 0.126 | 0.103 |
| Father's Years of Education | 12.4 | 10.6 | 9.5 | | (0.332) | (0.331) | (0.304) |
| | (5.3) | (5.4) | (6.6) | Hours worked: 30-40 hrs | 0.103 | 0.222 | 0.242 |
| Mother's Years of Education | 13.1 | 11.7 | 11.1 | | (0.304) | (0.415) | (0.428) |
| | (3.7) | (4.1) | (4.7) | Hours worked: 40-60 hrs | 0.045 | 0.127 | 0.188 |
| | | | | | (0.208) | (0.333) | (0.391) |
| | | | | Hours worked: 60+ hrs | 0.012 | 0.036 | 0.050 |
| | | | | | (0.107) | (0.187) | (0.219) |

**Table 2.2: Summary Statistics for Gap Year Students Split by Threshold Level**
**Low Threshold ($\bar{D}$ = 0.01)**

| | Type 2 Gap Year Students (above threshold) | | | | | Type 1 Gap Year Students (below threshold) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Obs | Mean | Std. Dev. | Min | Max | Obs | Mean | Std. Dev. | Min | Max |
| All Equations | | | | | | | | | | |
| Female | 1250 | 0.499 | 0.500 | 0 | 1 | 108 | 0.519 | 0.502 | 0 | 1 |
| Black | 1250 | 0.284 | 0.451 | 0 | 1 | 108 | 0.250 | 0.435 | 0 | 1 |
| Hispanic | 1250 | 0.230 | 0.421 | 0 | 1 | 108 | 0.213 | 0.411 | 0 | 1 |
| HS Graduation Age | 1250 | 18.0 | 1.2 | 12 | 28 | 108 | 18.7 | 2.2 | 16 | 29 |
| Income percentile (SES) | 1250 | 49.6 | 28.3 | 0.031 | 100 | 108 | 37.6 | 26.7 | 0.062 | 93.123 |
| ASVAB/1000 | 1052 | 47.0 | 25.9 | 0.15 | 100 | 89 | 30.8 | 20.9 | 0 | 78.6 |
| ASVAB score missing | 1250 | 0.158 | 0.365 | 0 | 1 | 108 | 0.176 | 0.383 | 0 | 1 |
| Outcome Equations Only | | | | | | | | | | |
| AAorBA 6 years after HS gr | 1250 | 0.160 | 0.367 | 0 | 1 | 108 | 0.037 | 0.190 | 0 | 1 |
| College Entry Age | 1250 | 21.1 | 3.0 | 16 | 31 | 108 | 24.9 | 2.6 | 19 | 30 |
| AAorBAage25 | 1250 | 0.196 | 0.397 | 0 | 1 | 108 | 0.028 | 0.165 | 0 | 1 |
| High School GPA | 892 | 274 | 52 | 42 | 400 | 75 | 239 | 56 | 100 | 365 |
| HS GPA missing | 1250 | 0.286 | 0.452 | 0 | 1 | 108 | 0.306 | 0.463 | 0 | 1 |
| Selection Equation Only | | | | | | | | | | |
| Hours worked: 10-20 hrs | 1250 | 0.102 | 0.303 | 0 | 1 | 108 | 0.028 | 0.165 | 0 | 1 |
| Hours worked: 20-30 hrs | 1250 | 0.126 | 0.332 | 0 | 1 | 108 | 0.093 | 0.291 | 0 | 1 |
| Hours worked: 30-40 hrs | 1250 | 0.223 | 0.417 | 0 | 1 | 108 | 0.231 | 0.424 | 0 | 1 |
| Hours worked: 40-60 hrs | 1250 | 0.132 | 0.339 | 0 | 1 | 108 | 0.176 | 0.383 | 0 | 1 |
| Hours worked: 60+ hrs | 1250 | 0.036 | 0.186 | 0 | 1 | 108 | 0.056 | 0.230 | 0 | 1 |
| Father's Years of Education | 1083 | 12.7 | 2.9 | 2 | 20 | 83 | 11.5 | 2.9 | 3 | 17 |
| Mother's Years of Education | 1198 | 12.5 | 2.8 | 2 | 20 | 99 | 11.6 | 2.4 | 6 | 18 |
| Married before college enroll | 1250 | 0.081 | 0.273 | 0 | 1 | 108 | 0.907 | 0.291 | 0 | 1 |
| Child before college enrollme | 1250 | 0.200 | 0.400 | 0 | 1 | 108 | 0.944 | 0.230 | 0 | 1 |

**Table 2.2: Summary Statistics for Gap Year Students Split by Threshold Level (continued)**
**High Threshold ($\bar{D}$ = 0.98)**

| | Type 2 Gap Year Students (above threshold) | | | | | Type 1 Gap Year Students (below threshold) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Obs | Mean | Std. Dev. | Min | Max | Obs | Mean | Std. Dev. | Min | Max |
| All Equations | | | | | | | | | | |
| Female | 127 | 0.787 | 0.411 | 0 | 1 | 1231 | 0.471 | 0.499 | 0 | 1 |
| Black | 127 | 0.110 | 0.314 | 0 | 1 | 1231 | 0.299 | 0.458 | 0 | 1 |
| Hispanic | 127 | 0.213 | 0.411 | 0 | 1 | 1231 | 0.230 | 0.421 | 0 | 1 |
| HS Graduation Age | 127 | 17.6 | 0.6 | 15 | 19 | 1231 | 18.1 | 1.3 | 12 | 29 |
| Income percentile (SES) | 127 | 69.8 | 23.2 | 0.031 | 100 | 1231 | 46.5 | 27.9 | 0.062 | 100 |
| ASVAB/1000 | 120 | 76.8 | 18.1 | 24.59 | 100 | 1021 | 42.1 | 24.2 | 0 | 100 |
| ASVAB score missing | 127 | 0.055 | 0.229 | 0 | 1 | 1231 | 0.171 | 0.376 | 0 | 1 |
| Outcome Equations Only | | | | | | | | | | |
| AAorBA 6 years after HS gr | 127 | 0.449 | 0.499 | 0 | 1 | 1231 | 0.119 | 0.324 | 0 | 1 |
| College Entry Age | 127 | 19.1 | 1.6 | 16 | 28 | 1231 | 21.6 | 3.2 | 16 | 31 |
| AAorBAage25 | 127 | 0.496 | 0.502 | 0 | 1 | 1231 | 0.150 | 0.357 | 0 | 1 |
| High School GPA | 111 | 328 | 36 | 251 | 400 | 856 | 264 | 50 | 42 | 400 |
| HS GPA missing | 127 | 0.126 | 0.333 | 0 | 1 | 1231 | 0.305 | 0.460 | 0 | 1 |
| Selection Equation Only | | | | | | | | | | |
| Hours worked: 10-20 hrs | 127 | 0.181 | 0.387 | 0 | 1 | 1231 | 0.088 | 0.283 | 0 | 1 |
| Hours worked: 20-30 hrs | 127 | 0.102 | 0.304 | 0 | 1 | 1231 | 0.126 | 0.332 | 0 | 1 |
| Hours worked: 30-40 hrs | 127 | 0.157 | 0.366 | 0 | 1 | 1231 | 0.231 | 0.421 | 0 | 1 |
| Hours worked: 40-60 hrs | 127 | 0.157 | 0.366 | 0 | 1 | 1231 | 0.133 | 0.340 | 0 | 1 |
| Hours worked: 60+ hrs | 127 | 0.024 | 0.152 | 0 | 1 | 1231 | 0.039 | 0.194 | 0 | 1 |
| Father's Years of Education | 122 | 14.2 | 2.9 | 4 | 20 | 1044 | 12.4 | 2.8 | 2 | 20 |
| Mother's Years of Education | 125 | 13.8 | 2.6 | 4 | 19 | 1172 | 12.3 | 2.7 | 2 | 20 |
| Married before college enroll | 127 | 0.000 | 0.000 | 0 | 0 | 1231 | 0.162 | 0.368 | 0 | 1 |
| Child before college enroll. | 127 | 0.000 | 0.000 | 0 | 0 | 1231 | 0.286 | 0.452 | 0 | 1 |

**Table 2.3: LN Earnings ($\bar{D}$ = 0.01)**

| LN Earnings | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | -0.286*** | -0.633*** | 1.636*** |
| | (0.059) | (0.238) | (0.337) |
| Black | -0.135* | -0.117 | 1.335*** |
| | (0.080) | (0.320) | (0.347) |
| Hispanic | 0.281*** | 0.274 | 1.298*** |
| | (0.080) | (0.318) | (0.378) |
| HS Graduation Age | 0.014 | 0.009 | -0.291** |
| | (0.036) | (0.095) | (0.115) |
| Income percentile (SES) | 0.003** | 0.006 | 0.017*** |
| | (0.001) | (0.005) | (0.005) |
| ASVAB/1000 | 0.002 | 0.007 | 0.052*** |
| | (0.001) | (0.007) | (0.009) |
| Associate's or Bachelor's Degree | 0.168** | 0.267 | 0.305 |
| | (0.084) | (0.630) | (0.697) |
| College Entry Age | -0.016 | -0.046 | 0.104** |
| | (0.011) | (0.048) | (0.050) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 1.125 |
| | | | (0.914) |
| Hours worked: 20-30 hrs | | | -0.121 |
| | | | (0.422) |
| Hours worked: 30-40 hrs | | | 0.451 |
| | | | (0.339) |
| Hours worked: 40-60 hrs | | | -0.057 |
| | | | (0.356) |
| Hours worked: 60+ hrs | | | -0.658 |
| | | | (0.637) |
| Father's Years of Education | | | -0.003 |
| | | | (0.027) |
| Mother's Years of Education | | | 0.040 |
| | | | (0.033) |
| Married before college enrollment | | | -4.613*** |
| | | | (0.561) |
| Child before college enrollment | | | -3.747*** |
| | | | (0.542) |
| Constant | 9.530*** | 10.410*** | 5.049** |
| | (0.644) | (2.164) | (2.322) |
| Observations | 1312 | 1312 | 1312 |
| Sigma 1 (type 1) | 1.182*** | (0.086) | |
| Sigma 2 (type 2) | 1.017*** | (0.021) | |
| Rho 1 (type 1 & selection) | 0.438*** | (0.189) | |
| Rho 2 (type 2 & selection) | 0.355*** | (0.154) | |

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

**Table 2.4: LN Earnings ($\bar{D}$ = 0.97)**

| LN Earnings | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | 0.081 | -0.164*** | 0.664*** |
| | (0.311) | (0.062) | (0.133) |
| Black | -0.242 | -0.039 | 0.252* |
| | (0.327) | (0.080) | (0.149) |
| Hispanic | 0.057 | 0.363*** | 0.462*** |
| | (0.271) | (0.083) | (0.145) |
| HS Graduation Age | -0.316* | 0.040 | 0.080 |
| | (0.170) | (0.035) | (0.074) |
| Income percentile (SES) | 0.006 | 0.005*** | 0.009*** |
| | (0.005) | (0.001) | (0.002) |
| ASVAB/1000 | -0.005 | 0.010*** | 0.028*** |
| | (0.011) | (0.002) | (0.003) |
| Associate's or Bachelor's Degree | 0.224 | 0.333*** | 0.441*** |
| | (0.245) | (0.094) | (0.125) |
| College Entry Age | 0.009 | -0.038*** | -0.091*** |
| | (0.069) | (0.011) | (0.030) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 0.227 |
| | | | (0.168) |
| Hours worked: 20-30 hrs | | | -0.008 |
| | | | (0.153) |
| Hours worked: 30-40 hrs | | | -0.163 |
| | | | (0.135) |
| Hours worked: 40-60 hrs | | | 0.081 |
| | | | (0.138) |
| Hours worked: 60+ hrs | | | -0.302 |
| | | | (0.251) |
| Father's Years of Education | | | 0.020 |
| | | | (0.013) |
| Mother's Years of Education | | | 0.025 |
| | | | (0.020) |
| Married before college enrollment | | | -6.333 |
| | | | (0.000) |
| Child before college enrollment | | | -7.108 |
| | | | (0.000) |
| Constant | 14.700*** | 9.158*** | -3.740*** |
| | (3.214) | (0.630) | (1.286) |
| Observations | 1312 | 1312 | 1312 |
| Sigma 1 (type 1) | 1.055*** | (0.023) | |
| Sigma 2 (type 2) | 1.141*** | (0.068) | |
| Rho 1 (type 1 & selection) | 0.947*** | (0.022) | |
| Rho 2 (type 2 & selection) | 0.060 | (0.466) | |

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

**Table 2.5: LN Wage ($\bar{D}$ = 0.01)**

| LN Wage | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | -0.113*** | -0.304** | 1.483*** |
| | (0.0363) | (0.153) | (0.310) |
| Black | -0.124** | 0.100 | 1.258*** |
| | (0.0492) | (0.206) | (0.331) |
| Hispanic | 0.0828* | 0.240 | 1.237*** |
| | (0.0494) | (0.206) | (0.383) |
| HS Graduation Age | 0.0697*** | -0.0177 | -0.310*** |
| | (0.0208) | (0.0575) | (0.0999) |
| Income percentile (SES) | 0.00267*** | 0.00198 | 0.0131*** |
| | (0.000721) | (0.00312) | (0.00500) |
| ASVAB/1000 | 0.000619 | 0.00848** | 0.0519*** |
| | (0.000849) | (0.00422) | (0.00839) |
| Associate's or Bachelor's Degree | 0.147*** | 1.883*** | 0.524 |
| | (0.0515) | (0.407) | (0.669) |
| College Entry Age | -0.0116* | 0.0125 | 0.104** |
| | (0.00703) | (0.0314) | (0.0477) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 1.212 |
| | | | (0.937) |
| Hours worked: 20-30 hrs | | | 0.145 |
| | | | (0.426) |
| Hours worked: 30-40 hrs | | | 0.443 |
| | | | (0.330) |
| Hours worked: 40-60 hrs | | | 0.00389 |
| | | | (0.345) |
| Hours worked: 60+ hrs | | | -0.369 |
| | | | (0.635) |
| Father's Years of Education | | | 0.00509 |
| | | | (0.0252) |
| Mother's Years of Education | | | 0.0384 |
| | | | (0.0317) |
| Married before college enrollment | | | -4.292*** |
| | | | (0.515) |
| Child before college enrollment | | | -3.673*** |
| | | | (0.513) |
| Constant | 6.055*** | 6.791*** | 5.219** |
| | (0.373) | (1.324) | (2.054) |
| Observations | 1332 | 1332 | 1332 |
| Sigma 1 | 0.758*** | (0.054) | |
| Sigma 2 | 0.630*** | (0.013) | |
| Rho 1 | 0.166 | (0.181) | |
| Rho 2 | -0.320 | (0.235) | |

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

**Table 2.6: LN Wage ($\bar{D}$ = 0.98)**

| LN Wage | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | -0.0326 | -0.142*** | 1.299*** |
| | (0.210) | (0.0378) | (0.169) |
| Black | -0.396 | -0.0771 | 0.758*** |
| | (0.257) | (0.0487) | (0.228) |
| Hispanic | 0.00565 | 0.105** | 0.668*** |
| | (0.177) | (0.0506) | (0.206) |
| HS Graduation Age | 0.187 | 0.0586*** | -0.0308 |
| | (0.119) | (0.0195) | (0.118) |
| Income percentile (SES) | 0.000089 | 0.00271*** | 0.0135*** |
| | (0.00343) | (0.000740) | (0.00321) |
| ASVAB/1000 | -0.00746 | 0.00183* | 0.0409*** |
| | (0.00621) | (0.000960) | (0.00429) |
| Associate's or Bachelor's Degree | -0.0431 | 0.243*** | 0.679*** |
| | (0.156) | (0.0586) | (0.165) |
| College Entry Age | -0.0298 | -0.0125* | -0.0833** |
| | (0.0470) | (0.00639) | (0.0422) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 0.174 |
| | | | (0.235) |
| Hours worked: 20-30 hrs | | | -0.369 |
| | | | (0.245) |
| Hours worked: 30-40 hrs | | | -0.342* |
| | | | (0.206) |
| Hours worked: 40-60 hrs | | | 0.244 |
| | | | (0.232) |
| Hours worked: 60+ hrs | | | -0.448 |
| | | | (0.441) |
| Father's Years of Education | | | 0.0513** |
| | | | (0.0214) |
| Mother's Years of Education | | | 0.0169 |
| | | | (0.0289) |
| Married before college enrollment | | | -6.121 |
| | | | (3,981) |
| Child before college enrollment | | | -6.948 |
| | | | (6,601) |
| Constant | 5.196** | 6.199*** | -4.171** |
| | (2.057) | (0.356) | (2.035) |
| Observations | 1332 | 1332 | 1332 |
| Sigma 1 | 0.633*** | (0.013) | |
| Sigma 2 | 0.745*** | (0.047) | |
| Rho 1 | 0.092 | (0.121) | |
| Rho 2 | 0.037 | (0.237) | |

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

**Table 2.7: Household Income at Age 25 ($\bar{D}$ = 0.01)**

| Household Income at Age 25 | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | -4,654 | 7,689 | 1.242*** |
| | (4,643) | (13,563) | (0.348) |
| Black | -514 | -2,122 | 0.938*** |
| | (6,403) | (18,361) | (0.318) |
| Hispanic | 7,123 | 17,274 | 0.709* |
| | (6,302) | (17,620) | (0.365) |
| HS Graduation Age | -3,351* | -2,095 | -0.079 |
| | (1,999) | (2,941) | (0.060) |
| Income percentile (SES) | 318*** | 25 | 0.015*** |
| | (93) | (284) | (0.005) |
| ASVAB/1000 | -156 | -10 | 0.041*** |
| | (111) | (366) | (0.009) |
| Associate's or Bachelor's Degree by Age 25 | 7,210 | 168,594*** | -0.100 |
| | (5,961) | (47,149) | (0.664) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 0.696 |
| | | | (0.751) |
| Hours worked: 20-30 hrs | | | -0.297 |
| | | | (0.359) |
| Hours worked: 30-40 hrs | | | 0.009 |
| | | | (0.328) |
| Hours worked: 40-60 hrs | | | -0.128 |
| | | | (0.351) |
| Hours worked: 60+ hrs | | | -1.188* |
| | | | (0.634) |
| Father's Years of Education | | | 0.014 |
| | | | (0.027) |
| Mother's Years of Education | | | -0.022 |
| | | | (0.031) |
| Married before college enrollment | | | -3.452*** |
| | | | (0.597) |
| Child before college enrollment | | | -3.105*** |
| | | | (0.566) |
| Constant | 76,800** | 58,858 | 3.954*** |
| | (37,768) | (60,397) | (1.347) |
| Observations | 1070 | 1070 | 1070 |
| Sigma 1 | 64560*** | (4707) | |
| Sigma 2 | 71757*** | (1629) | |
| Rho 1 | 0.136 | (0.220) | |
| Rho 2 | 0.570 | (0.292) | |

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

**Table 2.8: Household Income at Age 25 ($\bar{D}$ = 0.98)**

| Household Income at Age 25 | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | -84,940** | -3,048 | 1.305*** |
| | (35,198) | (4,528) | (0.190) |
| Black | -95,020** | -25.89 | 0.724*** |
| | (45,966) | (5,949) | (0.260) |
| Hispanic | -20,633 | 6,265 | 0.911*** |
| | (32,226) | (6,062) | (0.236) |
| HS Graduation Age | 9,700 | -3,297** | -0.0970 |
| | (19,819) | (1,606) | (0.114) |
| Income percentile (SES) | -449.8 | 227.8** | 0.0131*** |
| | (560.2) | (90.13) | (0.00350) |
| ASVAB/1000 | -4,026*** | -104.0 | 0.0426*** |
| | (1,111) | (113.5) | (0.00514) |
| Associate's or Bachelor's Degree by Age 25 | -59,247** | 12,581** | 0.612*** |
| | (28,116) | (6,243) | (0.174) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 0.657*** |
| | | | (0.245) |
| Hours worked: 20-30 hrs | | | -0.242 |
| | | | (0.252) |
| Hours worked: 30-40 hrs | | | -0.109 |
| | | | (0.211) |
| Hours worked: 40-60 hrs | | | 0.144 |
| | | | (0.250) |
| Hours worked: 60+ hrs | | | -1.264* |
| | | | (0.658) |
| Father's Years of Education | | | 0.0503** |
| | | | (0.0249) |
| Mother's Years of Education | | | 0.0243 |
| | | | (0.0315) |
| Married before college enrollment | | | -6.066 |
| | | | (2,194) |
| Child before college enrollment | | | -6.057 |
| | | | (416.5) |
| Constant | 391,703 | 77,843** | -4.976** |
| | (363,545) | (31,401) | (2.130) |
| Observations | 1070 | 1070 | 1070 |
| Sigma 1 | 68028*** | (1543) | |
| Sigma 2 | 130379*** | (17875) | |
| Rho 1 | 0.054 | (0.111) | |
| Rho 2 | -0.741*** | (0.103) | |

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

**Table 2.9: Degree Progress 6 Years after College Entry ($\bar{D}$ = 0.03)**

| AA or BA Degree Progress | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | -0.068 | -10.810 | 3.920 |
| | (2.569) | (11.450) | (2,005) |
| Black | -4.858 | 13.720 | -3.774 |
| | (3.498) | (13.980) | (89,161) |
| Hispanic | -0.301 | 12.200 | -0.491 |
| | (3.416) | (13.590) | (0.000) |
| HS Graduation Age | -1.046 | 0.292 | -2.572 |
| | (1.671) | (4.586) | (1,085) |
| Income percentile (SES) | 0.071 | 0.232 | 0.035 |
| | (0.051) | (0.218) | (575.700) |
| ASVAB/1000 | 0.072 | 0.085 | 0.047 |
| | (0.061) | (0.353) | (301.600) |
| High School GPA | 0.178*** | 0.001 | 0.032 |
| | (0.030) | (0.139) | (27.700) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 2.353 |
| | | | (0.000) |
| Hours worked: 20-30 hrs | | | 2.115 |
| | | | (35,678) |
| Hours worked: 30-40 hrs | | | -0.618 |
| | | | (0.000) |
| Hours worked: 40-60 hrs | | | -2.726 |
| | | | (2,697) |
| Hours worked: 60+ hrs | | | 13.740 |
| | | | (0.000) |
| Father's Years of Education | | | -0.076 |
| | | | (3,077) |
| Mother's Years of Education | | | 0.368 |
| | | | (2,587) |
| Married before college enrollment | | | -11.410 |
| | | | (0.000) |
| Child before college enrollment | | | -7.176 |
| | | | (0.000) |
| Constant | 17.290 | 34.240 | 44.230 |
| | (31.950) | (103.800) | (0.000) |
| Observations | 808 | 808 | 808 |
| Sigma 1 (type 1) | 25.969*** | (3.471) | |
| Sigma 2 (type 2) | 35.027*** | (0.887) | |
| Rho 1 (type 1 & selection) | -0.999 | (0.004) | |
| Rho 2 (type 2 & selection) | -0.999 | (0.030) | |

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

**Table 2.10: Degree Progress 6 Years after College Entry ($\overline{D}$ = 0.98)**

| AA or BA Degree Progress | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | -6.399 | -0.973 | 1.470*** |
| | (9.002) | (2.889) | (0.214) |
| Black | -11.36 | -2.728 | 1.118*** |
| | (10.95) | (3.695) | (0.283) |
| Hispanic | -7.805 | 2.412 | 1.005*** |
| | (7.769) | (3.718) | (0.266) |
| HS Graduation Age | 14.29*** | -3.281** | -0.185 |
| | (4.734) | (1.660) | (0.139) |
| Income percentile (SES) | 0.123 | 0.0799 | 0.0186*** |
| | (0.151) | (0.0560) | (0.00393) |
| ASVAB/1000 | 0.267 | 0.0398 | 0.0433*** |
| | (0.255) | (0.0757) | (0.00565) |
| High School GPA | 0.347*** | 0.156*** | 0.0176*** |
| | (0.106) | (0.0356) | (0.00286) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 0.404 |
| | | | (0.289) |
| Hours worked: 20-30 hrs | | | -0.143 |
| | | | (0.308) |
| Hours worked: 30-40 hrs | | | -0.322 |
| | | | (0.250) |
| Hours worked: 40-60 hrs | | | 0.408 |
| | | | (0.285) |
| Hours worked: 60+ hrs | | | 0.0930 |
| | | | (0.518) |
| Father's Years of Education | | | 0.0361 |
| | | | (0.0243) |
| Mother's Years of Education | | | 0.0469 |
| | | | (0.0330) |
| Married before college enrollment | | | -7.187 |
| | | | (5,260) |
| Child before college enrollment | | | -7.313 |
| | | | (17,346) |
| Constant | -322.2*** | 63.81* | -9.021*** |
| | (95.15) | (33.01) | (2.683) |
| Observations | 808 | 808 | 808 |
| Sigma 1 (type 1) | 35.227*** | (0.954) | |
| Sigma 2 (type 2) | 30.516*** | (2.241) | |
| Rho 1 (type 1 & selection) | 0.187 | (0.199) | |
| Rho 2 (type 2 & selection) | 0.254 | (0.263) | |

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

**Table 2.11: Degree Completion 6 Years after College Entry ($\bar{D}$ = 0.03)**

| AA or BA Degree Completion | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | 0.015 | -0.017 | 1.770*** |
| | (0.023) | (0.029) | (0.295) |
| Black | -0.028 | 0.008 | 1.546*** |
| | (0.032) | (0.039) | (0.336) |
| Hispanic | 0.009 | 0.027 | 1.211*** |
| | (0.031) | (0.039) | (0.355) |
| HS Graduation Age | -0.021* | -0.001 | -0.331*** |
| | (0.011) | (0.006) | (0.076) |
| Income percentile (SES) | 0.001*** | -0.000 | 0.022*** |
| | (0.000) | (0.001) | (0.005) |
| ASVAB/1000 | 0.001* | 0.000 | 0.047*** |
| | (0.001) | (0.001) | (0.008) |
| High School GPA | 0.002*** | 0.000 | 0.012*** |
| | (0.000) | (0.000) | (0.003) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 0.046 |
| | | | (0.492) |
| Hours worked: 20-30 hrs | | | 0.197 |
| | | | (0.373) |
| Hours worked: 30-40 hrs | | | 0.234 |
| | | | (0.319) |
| Hours worked: 40-60 hrs | | | -0.007 |
| | | | (0.371) |
| Hours worked: 60+ hrs | | | -0.717 |
| | | | (0.639) |
| Father's Years of Education | | | -0.028 |
| | | | (0.023) |
| Mother's Years of Education | | | 0.044 |
| | | | (0.028) |
| Married before college enrollment | | | -4.603*** |
| | | | (0.500) |
| Child before college enrollment | | | -3.898*** |
| | | | (0.475) |
| Constant | -0.031 | 0.026 | 4.734*** |
| | (0.224) | (0.158) | (1.591) |
| Observations | 1358 | 1358 | 1358 |
| Sigma 1 (type 1) | 0.175*** | (0.010) | |
| Sigma 2 (type 2) | 0.398*** | (0.008) | |
| Rho 1 (type 1 & selection) | 0.135 | (0.179) | |
| Rho 2 (type 2 & selection) | -0.354 | (0.168) | |

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

**Table 2.12: Degree Completion 6 Years after College Entry ($\bar{D}$ = 0.98)**

| AA or BA Degree Completion | Type 2 | Type 1 | Selection |
|---|---|---|---|
| Female | 0.027 | -0.013 | 1.461*** |
| | (0.162) | (0.022) | (0.197) |
| Black | -0.050 | -0.007 | 0.967*** |
| | (0.178) | (0.028) | (0.260) |
| Hispanic | -0.178 | 0.043 | 0.892*** |
| | (0.118) | (0.029) | (0.235) |
| HS Graduation Age | 0.093 | -0.022*** | -0.148 |
| | (0.068) | (0.008) | (0.118) |
| Income percentile (SES) | 0.002 | 0.001** | 0.017*** |
| | (0.003) | (0.000) | (0.004) |
| ASVAB/1000 | 0.003 | 0.000 | 0.041*** |
| | (0.005) | (0.001) | (0.005) |
| High School GPA | 0.005** | 0.001*** | 0.019*** |
| | (0.002) | (0.000) | (0.003) |
| Hrs worked 5 mths post HS grad | | | |
| Hours worked: 10-20 hrs | | | 0.303 |
| | | | (0.259) |
| Hours worked: 20-30 hrs | | | -0.176 |
| | | | (0.285) |
| Hours worked: 30-40 hrs | | | -0.166 |
| | | | (0.224) |
| Hours worked: 40-60 hrs | | | 0.459* |
| | | | (0.246) |
| Hours worked: 60+ hrs | | | -0.455 |
| | | | (0.465) |
| Father's Years of Education | | | 0.030 |
| | | | (0.023) |
| Mother's Years of Education | | | 0.045 |
| | | | (0.032) |
| Married before college enrollment | | | -7.456 |
| | | | (6,411) |
| Child before college enrollment | | | -7.617 |
| | | | (5,389) |
| Constant | -3.141* | 0.165 | -9.668*** |
| | (1.606) | (0.174) | (2.389) |
| Observations | 1358 | 1358 | 1358 |
| Sigma 1 (type 1) | 0.365*** | (0.007) | |
| Sigma 2 (type 2) | 0.473*** | (0.043) | |
| Rho 1 (type 1 & selection) | -0.122 | (0.125) | |
| Rho 2 (type 2 & selection) | 0.330 | (0.410) | |

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

REFERENCES

Bozick, R., & DeLuca, S. (2005). Better Late than Never? Delayed Enrollment in the High School to College Transition. *Social Forces, 84*(1), 531-554.

Featherman, D.L. & Carter, T.M. (1976) "Discontinuities in Schooling and the Socioeconomic Life Cycle." In *Schooling and Achievement in American Society*, edited by William H. Sewell, Robert M. Hauser, and David Featherman. Academic.

Goldrick-Rab, S., & Han, S. (2011). Accounting for Socioeconomic Differences in Delaying the Transition to College. *The Review of Higher Education, 34*(3), 423-445.

Hearn, J.C. (1992). Emerging Variations in Postsecondary Attendance Patterns: An Investigation of Part-Time Delayed, and Nondegree Enrollment. *Research in Higher Education* 33, 657-687.

Hotchkiss, J. L., & Pitts, M. (2005). Female labour force intermittency and current earnings: switching regression model with unknown sample selection. *Applied Economics, 37*(5), 545-560.

Lokshin, M., & Sajaia, Z. (2004). Maximum likelihood estimation of endogenous switching regression models. *The Stata Journal, 4*(3), 282-289.

Maddala, G. S. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge: Cambridge University Press.

Martin, A.J. (2010). Should students have a gap year? Motivation and performance factors relevant to time out after completing school. *Journal of Educational Psychology, 102*(3), 561-576.

National Center for Education Statistics. (2005). *Waiting to Attend College: Undergraduates Who Delay Their Postsecondary Enrollment (NCES 2005-152)*. Washington, DC: U.S. Department of Education.

Roksa, J., & Velez, M. (2012). A Late Start: Delayed Entry, Life Course Transitions and Bachelor's Degree Completion. *Social Forces 90*(3): 769-794.

# CONCLUSION AND EXTENSIONS

This dissertation has focused on the labor market and academic outcomes of gap year students. The first essay set out to discover which type of postsecondary institution would best serve gap year students. It found that initially enrolling in most institution types leads to similar outcomes for gap year students as initially enrolling in a public four-year institution. However, enrolling in a private two-year institution, for-profit or not-for-profit, showed evidence of generally worse outcomes in the labor market and sometimes in academic outcomes. These results continued to hold after controlling for selection using nearest neighbor matching with a propensity score for each institution type.

The second essay determined that there are at least two types of gap year students and most likely three types. Most gap year students suffer a penalty in terms of lower earnings and lower academic achievement when they choose to delay enrollment in college. In chapter two, the regime switching model used maximum likelihood estimation to split the gap year students into two groups, where above the threshold are found the type 2 gap year students that are delaying enrollment in college for personal enrichment reasons. These are students that we might reasonably expect to enroll in college directly if not given the opportunity for a gap year. These students form a minority of the entire group of gap year students, but they are also found to suffer no penalty when delaying college enrollment. Specifically, the earnings of type 2 gap year students at six years after high school graduation are statistically similar to students who enroll directly in college. This includes the time that the gap year students took off before they went to college, which means that they caught up to the direct enrollment students.

I plan to extend the research from these chapters in a few ways. I would like to examine the earning paths of gap year students compared to direct enrollment

students. The NLSY97 dataset has been extended by a few more years, so this type of analysis would be more meaningful. It would be interesting to see if the earning path of gap year students is the same as the earning path of direct-to-college students just delayed a year or two; if it is a flatter earnings path which implies another penalty to delayed entry; or if there is a steeper earnings path for gap year students and they are able to catch up. I will also use the division between type 1 and type 2 gap year students derived in the second chapter to see if the earnings paths act differently for those groups as well.

Additionally, I would like to use the confidential Geocode version of the NLSY97 data and further analyze the types of schools that the gap year students attend. I would like to extend the results from chapter two to determine if students who took a gap year for personally enriching reasons enroll in better ranking institutions than we might otherwise expect. This could show that for some students, a gap year could actually be a benefit instead of a penalty or an activity that neither helps nor hurts their life progress. Finally, I will explore how well the students match on their initial enrollment choice. This can be examined by looking at transfers of institutions and how many times a student transfers. I can also use information on intended degree and initial enrollment choice as well as final degree or credits completed to see how well their educational path matched their original plans.

APPENDIX

**Figure A.1: Log Wages**
**Values of Maximum Likelihood Estimator at each Threshold Level**

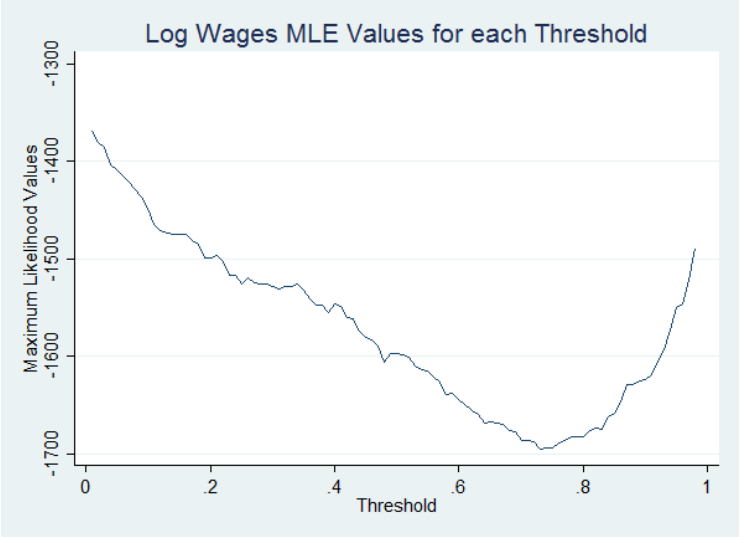



**Figure A.2: Household Income at Age 25**
**Values of Maximum Likelihood Estimator at each Threshold Level**

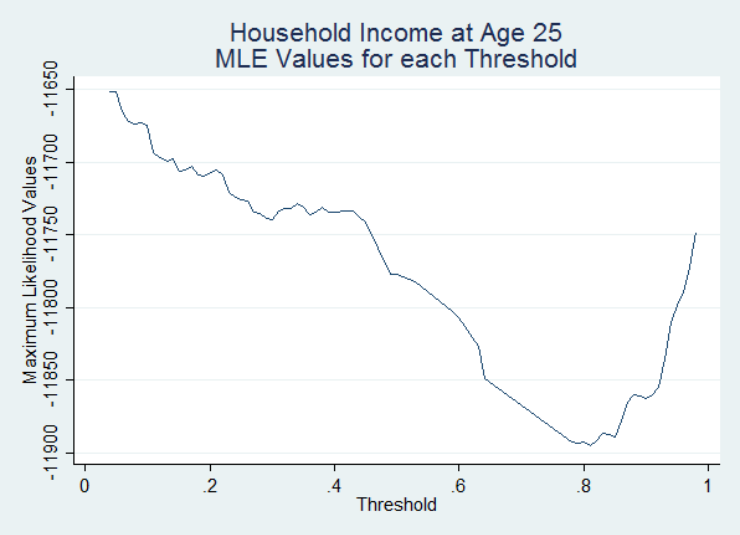


**Figure A.3: Associate or Bachelor's Degree Progress**
**Values of Maximum Likelihood Estimator at each Threshold Level**

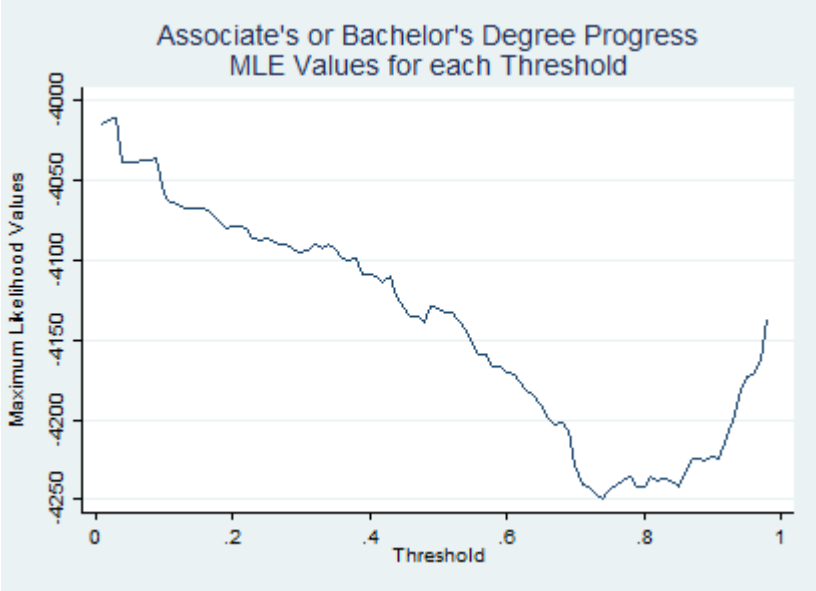



**Figure A.4: Associate or Bachelor's Degree Completion**
**Values of Maximum Likelihood Estimator at each Threshold Level**

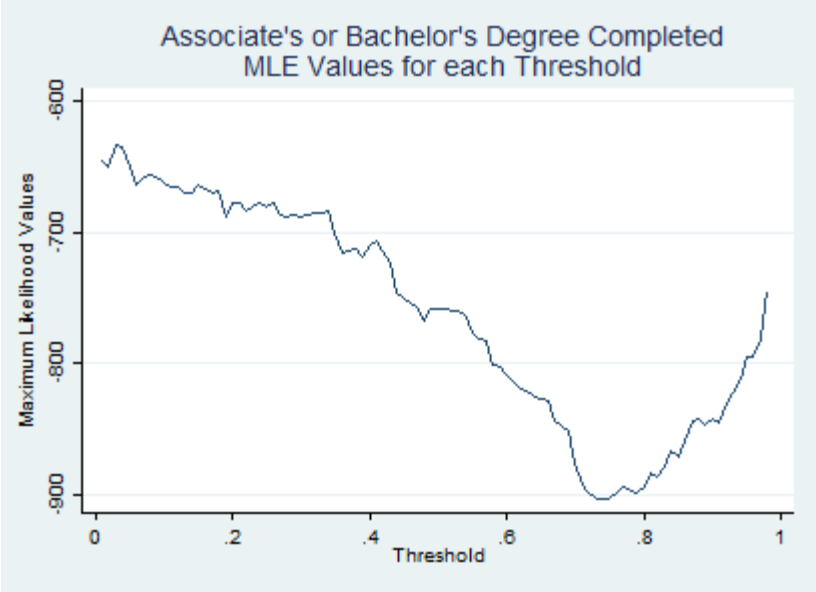


**Table A.1: Summary Statistics for Gap Year Students Split by Threshold ($\bar{D}$ = 0.02)**

| | Type 2 Gap Year Students (above threshold) | | | | | Type 1 Gap Year Students (below threshold) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Obs | Mean | Std. Dev. | Min | Max | Obs | Mean | Std. Dev. | Min | Max |
| All Equations | | | | | | | | | | |
| Female | 1222 | 0.500 | 0.500 | 0 | 1 | 136 | 0.507 | 0.502 | 0 | 1 |
| Black | 1222 | 0.280 | 0.449 | 0 | 1 | 136 | 0.294 | 0.457 | 0 | 1 |
| Hispanic | 1222 | 0.229 | 0.420 | 0 | 1 | 136 | 0.221 | 0.416 | 0 | 1 |
| HS Graduation Age | 1222 | 18.0 | 1.1 | 12 | 27 | 136 | 18.8 | 2.3 | 16 | 29 |
| Income percentile (SES) | 1222 | 50.1 | 28.2 | 0.031 | 100 | 136 | 36.0 | 26.3 | 0.062 | 93.123 |
| ASVAB/1000 | 1031 | 47.4 | 25.8 | 0.15 | 100 | 110 | 30.1 | 21.2 | 0 | 80.6 |
| ASVAB score missing | 1222 | 0.156 | 0.363 | 0 | 1 | 136 | 0.191 | 0.395 | 0 | 1 |
| Outcome Equations Only | | | | | | | | | | |
| AAorBA 6 years after HS gr | 1222 | 0.163 | 0.369 | 0 | 1 | 136 | 0.037 | 0.189 | 0 | 1 |
| College Entry Age | 1222 | 21.0 | 3.0 | 16 | 31 | 136 | 25.0 | 2.6 | 19 | 31 |
| AAorBAage25 | 1222 | 0.200 | 0.401 | 0 | 1 | 136 | 0.022 | 0.147 | 0 | 1 |
| High School GPA | 876 | 275 | 52 | 42 | 400 | 91 | 241 | 56 | 100 | 365 |
| HS GPA missing | 1222 | 0.283 | 0.451 | 0 | 1 | 136 | 0.331 | 0.472 | 0 | 1 |
| Selection Equation Only | | | | | | | | | | |
| Hours worked: 10-20 hrs | 1222 | 0.102 | 0.303 | 0 | 1 | 136 | 0.044 | 0.206 | 0 | 1 |
| Hours worked: 20-30 hrs | 1222 | 0.128 | 0.335 | 0 | 1 | 136 | 0.081 | 0.274 | 0 | 1 |
| Hours worked: 30-40 hrs | 1222 | 0.223 | 0.417 | 0 | 1 | 136 | 0.228 | 0.421 | 0 | 1 |
| Hours worked: 40-60 hrs | 1222 | 0.134 | 0.341 | 0 | 1 | 136 | 0.147 | 0.355 | 0 | 1 |
| Hours worked: 60+ hrs | 1222 | 0.036 | 0.186 | 0 | 1 | 136 | 0.051 | 0.222 | 0 | 1 |
| Father's Years of Education | 1061 | 12.7 | 2.9 | 2 | 20 | 105 | 11.6 | 2.8 | 3 | 18 |
| Mother's Years of Education | 1174 | 12.5 | 2.8 | 2 | 20 | 123 | 11.7 | 2.5 | 6 | 20 |
| Married before college enroll | 1222 | 0.070 | 0.255 | 0 | 1 | 136 | 0.838 | 0.370 | 0 | 1 |
| Child before college enrollme | 1222 | 0.187 | 0.390 | 0 | 1 | 136 | 0.912 | 0.285 | 0 | 1 |

**Table A.2: Summary Statistics for Gap Year Students Split by Threshold ($\bar{D}$ = 0.03)**

| | Type 2 Gap Year Students (above threshold) | | | | | Type 1 Gap Year Students (below threshold) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Obs | Mean | Std. Dev. | Min | Max | Obs | Mean | Std. Dev. | Min | Max |
| All Equations | | | | | | | | | | |
| Female | 1205 | 0.500 | 0.500 | 0 | 1 | 153 | 0.503 | 0.502 | 0 | 1 |
| Black | 1205 | 0.282 | 0.450 | 0 | 1 | 153 | 0.275 | 0.448 | 0 | 1 |
| Hispanic | 1205 | 0.230 | 0.421 | 0 | 1 | 153 | 0.216 | 0.413 | 0 | 1 |
| HS Graduation Age | 1205 | 18.0 | 1.1 | 12 | 27 | 153 | 18.8 | 2.3 | 16 | 29 |
| Income percentile (SES) | 1205 | 50.1 | 28.3 | 0.031 | 100 | 153 | 37.4 | 26.6 | 0.062 | 95.524 |
| ASVAB/1000 | 1017 | 47.4 | 25.9 | 0.15 | 100 | 124 | 31.8 | 22.0 | 0 | 80.6 |
| ASVAB score missing | 1205 | 0.156 | 0.363 | 0 | 1 | 153 | 0.190 | 0.393 | 0 | 1 |
| Outcome Equations Only | | | | | | | | | | |
| AAorBA 6 years after HS gr | 1205 | 0.165 | 0.371 | 0 | 1 | 153 | 0.033 | 0.178 | 0 | 1 |
| College Entry Age | 1205 | 20.9 | 2.9 | 16 | 31 | 153 | 25.0 | 2.6 | 19 | 31 |
| AAorBAage25 | 1205 | 0.203 | 0.403 | 0 | 1 | 153 | 0.020 | 0.139 | 0 | 1 |
| High School GPA | 869 | 275 | 52 | 42 | 400 | 98 | 242 | 56 | 100 | 365 |
| HS GPA missing | 1205 | 0.279 | 0.449 | 0 | 1 | 153 | 0.359 | 0.481 | 0 | 1 |
| Selection Equation Only | | | | | | | | | | |
| Hours worked: 10-20 hrs | 1205 | 0.103 | 0.304 | 0 | 1 | 153 | 0.046 | 0.210 | 0 | 1 |
| Hours worked: 20-30 hrs | 1205 | 0.128 | 0.334 | 0 | 1 | 153 | 0.092 | 0.289 | 0 | 1 |
| Hours worked: 30-40 hrs | 1205 | 0.226 | 0.418 | 0 | 1 | 153 | 0.209 | 0.408 | 0 | 1 |
| Hours worked: 40-60 hrs | 1205 | 0.134 | 0.340 | 0 | 1 | 153 | 0.150 | 0.359 | 0 | 1 |
| Hours worked: 60+ hrs | 1205 | 0.036 | 0.186 | 0 | 1 | 153 | 0.052 | 0.223 | 0 | 1 |
| Father's Years of Education | 1046 | 12.7 | 2.9 | 2 | 20 | 120 | 11.7 | 2.7 | 3 | 18 |
| Mother's Years of Education | 1157 | 12.5 | 2.8 | 2 | 20 | 140 | 11.7 | 2.6 | 6 | 20 |
| Married before college enroll | 1205 | 0.061 | 0.240 | 0 | 1 | 153 | 0.817 | 0.388 | 0 | 1 |
| Child before college enrollme | 1205 | 0.178 | 0.382 | 0 | 1 | 153 | 0.902 | 0.298 | 0 | 1 |

**Table A.3: Summary Statistics for Gap Year Students Split by Threshold ($\bar{D}$ = 0.97)**

| | Type 2 Gap Year Students (above threshold) | | | | | Type 1 Gap Year Students (below threshold) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Obs | Mean | Std. Dev. | Min | Max | Obs | Mean | Std. Dev. | Min | Max |
| All Equations | | | | | | | | | | |
| Female | 153 | 0.778 | 0.417 | 0 | 1 | 1205 | 0.466 | 0.499 | 0 | 1 |
| Black | 153 | 0.131 | 0.338 | 0 | 1 | 1205 | 0.300 | 0.459 | 0 | 1 |
| Hispanic | 153 | 0.203 | 0.403 | 0 | 1 | 1205 | 0.232 | 0.422 | 0 | 1 |
| HS Graduation Age | 153 | 17.6 | 0.6 | 15 | 19 | 1205 | 18.1 | 1.3 | 12 | 29 |
| Income percentile (SES) | 153 | 67.7 | 24.1 | 0.031 | 100 | 1205 | 46.3 | 27.9 | 0.062 | 100.000 |
| ASVAB/1000 | 143 | 74.9 | 18.7 | 22.651 | 100 | 998 | 41.5 | 24.0 | 0 | 99.7 |
| ASVAB score missing | 153 | 0.065 | 0.248 | 0 | 1 | 1205 | 0.172 | 0.377 | 0 | 1 |
| Outcome Equations Only | | | | | | | | | | |
| AAorBA 6 years after HS gr | 153 | 0.405 | 0.493 | 0 | 1 | 1205 | 0.118 | 0.323 | 0 | 1 |
| College Entry Age | 153 | 19.2 | 1.8 | 16 | 29 | 1205 | 21.7 | 3.2 | 16 | 31 |
| AAorBAage25 | 153 | 0.451 | 0.499 | 0 | 1 | 1205 | 0.149 | 0.356 | 0 | 1 |
| High School GPA | 132 | 322 | 41 | 169 | 400 | 835 | 263 | 50 | 42 | 400 |
| HS GPA missing | 153 | 0.137 | 0.345 | 0 | 1 | 1205 | 0.307 | 0.461 | 0 | 1 |
| Selection Equation Only | | | | | | | | | | |
| Hours worked: 10-20 hrs | 153 | 0.163 | 0.371 | 0 | 1 | 1205 | 0.088 | 0.283 | 0 | 1 |
| Hours worked: 20-30 hrs | 153 | 0.118 | 0.323 | 0 | 1 | 1205 | 0.124 | 0.330 | 0 | 1 |
| Hours worked: 30-40 hrs | 153 | 0.163 | 0.371 | 0 | 1 | 1205 | 0.232 | 0.422 | 0 | 1 |
| Hours worked: 40-60 hrs | 153 | 0.163 | 0.371 | 0 | 1 | 1205 | 0.132 | 0.339 | 0 | 1 |
| Hours worked: 60+ hrs | 153 | 0.026 | 0.160 | 0 | 1 | 1205 | 0.039 | 0.194 | 0 | 1 |
| Father's Years of Education | 146 | 14.0 | 2.9 | 4 | 20 | 1020 | 12.4 | 2.8 | 2 | 20 |
| Mother's Years of Education | 151 | 13.7 | 2.6 | 4 | 19 | 1146 | 12.3 | 2.7 | 2 | 20 |
| Married before college enroll | 153 | 0.000 | 0.000 | 0 | 0 | 1205 | 0.165 | 0.371 | 0 | 1 |
| Child before college enrollme | 153 | 0.000 | 0.000 | 0 | 0 | 1205 | 0.292 | 0.455 | 0 | 1 |