Choose Wisely

A Study of College Major Choice and Major Switching Behavior

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Abstract

At many universities, more than half of students change majors at least once and a large fraction of these students change majors multiple times. The potential causes and effects of these very common behaviors are relatively understudied. This dissertation explores the college major decision-making process, both for initial and subsequent major choices, and analyzes the associations between major choice behaviors and student outcomes such as time to degree and probability of graduation. This was done via a descriptive quantitative analysis of nationally representative data along with a mixed methods case study at an Ohio public university. This case study included interviews and focus groups with major deciding students, major switchers, and academic advisors along with a descriptive quantitative analysis of data from university graduates.

The results suggest that entering college undecided has no cost in terms of a reduction of probability of graduation or little cost in terms of extending time to degree if a major is declared prior to sophomore year. Major switching is associated with extended time to degree, but the timing at which the final major decision is made drives the extent of this cost. There is some evidence that major switching may raise the probability of graduation. This may be because poor academic performance is a primary driver of major switches, a finding well supported with both qualitative and quantitative evidence.

University administrators and other policy makers can use findings from this work to help design programs and interventions that will help major decision-making students find the right major for them more quickly and avoid costly major selection behaviors. Exploratory programs with intensive advising for undeclared freshmen are a good idea and there is a good argument for extending these services to declared freshmen as well. Requiring a visit to an academic advisor prior to a major switch can help students avoid particularly costly switches. Career or field activities in a major area or academic performance in a key gatekeeper course like science or math make students decisive about a major and should be encouraged to be undertaken as early as possible.
Chapter One: Introduction & Research Design

A student’s choice of major field of study in college, the timing of this decision, and changes in this decision can have a significant impact on the probability of graduation, time of degree completion, and, ultimately, the cost of college. This dissertation seeks to improve life outcomes of college students by examining the effect of major selection behavior on these measures of student outcomes, understanding how students decide on a major and when to switch a major, and using this information to inform policy, practice of university administrators, and ultimately, future student decisions.

Bachelor-degree-granting programs are almost universally designed to take four years to complete, but this timeline is not the reality for the majority of students at many institutions. According to the National Center for Education Statistics\(^1\), only 39.8\% of first-time full-time college students entering in 2009 graduated in four years or fewer. Many of these students may not take the possibility of longer time to degree into account when making the decision to attend college in the first place and are may be left saddled with unexpected debt.

There are many factors that can lead to extended times to degree. Students could take light credit loads, have unexpected poor academic performance that results in retaking courses, or not take courses that are required to graduate when they are initially offered. One potential cause of extended times to degree of particular interest to this study is major choices and major switching behavior. Switching one’s major is an extremely widespread phenomenon and differing degree requirements and a lack of credit compatibility between majors may lead to extended times to degree. According to nationally representative data, 46\% of all first-time full-time students entering four-year undergraduate degree programs in 2003 had changed their major at least once by 2009 ("Beginning Postsecondary Students Longitudinal Study," 2004-2009). On the other end of the spectrum, remaining undecided on a major for too long may also be detrimental to graduation prospects and time to degree as it delays the initiation of major-specific course tracks designed to take a particular length of time.

The financial burden of tuition has long been a significant challenge, but these challenges have grown in recent times. Inflation-adjusted in-state tuition costs at four-year public institutions have grown 185\% nationally between 2001 and 2016, and are projected to continue to rise over the coming years (Ma et al., 2016). The average time to degree completion has also

been rising steadily since the 1970s (Bound, Lovenheim and Turner, 2012). These two factors are combining to amplify the rising total cost of attendance. Students are taking longer to graduate and each additional semester costs more than it did in the past. Longer time to degree completion also leads to a greater amount of opportunity cost in forgone wages while students remain outside the labor force.

This all adds up to additional financial burden to students, often in the form of larger amounts of student loans. In total, Americans owe around $1.2 trillion in student loans and this amount has grown by over 300% between 2003 and 2015 (Quarterly Report on Household Debt and Credit, 2015). This is not part of some greater societal trend towards indebtedness, either. In comparison, credit card debt has fallen slightly between 2003 and 2015 and student loans are the only type of debt that has increased since the peak of indebtedness was reached in 2008 (Quarterly Report on Household Debt and Credit, 2015). There has been a 12 percent increase in the amount of students that are seeking a four year college education from 2005 to 2016, but this only accounts for a small portion of the increase in outstanding student loan debt (Ma et al., 2016).

Increasing time to degree also has ramifications beyond the personal finance of students. Public higher education funding models in 32 states (with an additional five states in the process of transitioning) have moved away from a “seat time” basis and include some sort of productivity measure, such as four-year and six-year graduation rates, and this new reality has changed the incentive structure for many universities ("Performance-based Funding for Higher Education," 2015). In Ohio, for example, the percentage of state funding directly tied to degree attainment increased from 20% to 50% in 2012, greatly increasing pressure on university administrators to graduate students and to do so in a timely manner (Recommendations of the Ohio Higher Education Funding Commission, 2012). If major choices and major switching behavior have ramifications on the performance measures used to distribute funding, universities are incentivized to understand how majors are chosen and to design policies to help students make better and more informed major decisions.

As long as students pay tuition by credit hour, quarter, or semester, there are two fundamental factors at play in the overall cost of college. The first is obviously the tuition charged by the institution. We have already seen that these costs are on an upward trend and this trend is not likely to end anytime soon. The second fundamental factor is how many credit hours, quarters, or semesters that a student attends a school prior to graduation. This dissertation aims to address the second factor by shedding light on how major choice and major switching behavior affect time to degree and graduation. Findings from this work will help colleges and universities design policies and programs that will help students make better major decisions and potentially graduate more quickly.
Research Questions

Students make college major decisions with imperfect information and this can cause inefficiency in course taking and degree completion stemming from mismatches between student and major. This dissertation aims to describe how major choices might affect student outcomes like time to degree and elucidate the major decision-making process in an effort to inform future interventions. I do this by examining college major choice and major switching behavior through the following four research questions:

1. How do students choose their majors and what factors are important in a student’s choice of major field of study?
2. Does the relative importance of these factors change for subsequent major choices?
3. How does the expected time to degree and the probability of graduation change with different initial major choices, including entering undecided, or changes in major?
4. Are there different effects based on the timing of initial major selection, timing of major change, or the number of times a major is changed?

Research Design

Overview

The approach to address the previously discussed research questions relies on both quantitative and qualitative methods. The choice to rely on a mixture of methodologies is motivated by the inherent presence of selection bias when studying the link between major choices and student outcomes. It has proven nearly impossible for researchers (including myself) to disentangle the true relationship between major choices and student outcomes via causal inference methods. In lieu of the ability to apply causal inference methods to the problem, I have chosen to proceed with a descriptive quantitative analysis that doesn’t fully control for selection bias (but does control for a rich set of observable characteristics), but is augmented by rich qualitative data from students and academic advisors. The qualitative data can help identify potential mechanisms through which major decision-making affects student outcomes and quantitative analysis can be used to numerically explore phenomena that come up during the qualitative discussions.

This dissertation begins with a comprehensive literature review of all relevant works which sets the foundation for the rest of the project. This has informed the answers for several of the research questions and provided important parameters and defined key measures for other research questions. The next chapter includes the descriptive analysis of nationally representative data followed by several chapters including the results from an in-depth case study of major selection and switching behavior at one Ohio public university that involves qualitative and quantitative components. The dissertation ends with a scan of current policies designed to give a context to the preceding work and provide a base from which to discuss the policy implications of the findings.
For the nationally representative quantitative analysis, I use data from the Beginning Postsecondary Student Longitudinal Survey (BPS). This analysis of BPS data explores the relation of major choice and major switching to graduation and time to degree from several angles using regression techniques described in greater detail in the relevant chapter.

A case study of major selection and switching behavior was conducted at a public university in Ohio using both quantitative and qualitative methods. Analysis of the more detailed student data provided by the university augments the findings from the nationally representative data on research questions three and four. The approach to these questions will include regression models similar to those applied to the BPS data, along with a few other approaches facilitated by the greater level of detail present in the data.

For the qualitative portion of the university case study, semi-structured interviews and focus groups were conducted at the university with undecided freshmen, students that recently changed their major, and senior students ready to graduate in order to glean information about how and why students selected their particular fields of study and if these answers differ for initial major selections and major changes. For the undecided students, two semi-structured interviews were conducted on a random sample of undecided students with each student being interviewed in a longitudinal fashion – one in the 1st semester of the 2016-17 school year and another during the summer after the end of the 2nd semester of that school year. Both of these interviews used similar protocols that involved a few structured elements regarding probable major choices and were analyzed for changes over time. Focus groups were conducted with groups of students that recently changed their major concentrating on their reasons for changing their major and with students near graduation for reflection back on their choice of major. Semi-structured interviews with a select group of academic advisors were also conducted. Findings from these sessions informed the first and second research questions and also informed the policy implications of this project.

Data Sources and Primary Collection Methods

The data sources and collection methods included both primary and secondary sources and vary by research question. In this section, I discuss sources and collection methods by data source. A more detailed description of each data set described here can be found in the relevant chapters later in the dissertation.

Secondary Data Sources

This dissertation uses two distinct secondary data sources to conduct quantitative analysis for research questions three and four. The first is the restricted use data from the most recent completed cohort of the Beginning Postsecondary Students Longitudinal Survey (BPS), a data set collected and housed by the United State Department of Education. Students in this study were surveyed at the end of their first academic year (2003-04) and were followed up with at the
end of their third (2005-06) and sixth (2008-09) year after their postsecondary education started. This data set is nationally representative and contains records on approximately 16,700 students.

I also used secondary student data directly provided by a public university in Ohio that had been made anonymous prior to my access. An ad-hoc report was prepared by the university’s institutional research office with semester-by-semester academic records of graduates including major selection history and included a robust set of potential control variables to help account for potential biases.

In both cases, I limited my analysis to first-time full-time undergraduate students. While there are notable quantities of part time and returning students, they attend college under widely varying circumstances. Limiting the sample to more “traditional” first time full time students provides a more homogeneous group that has reasonable expectations of being on the same four-year bachelor’s degree timeline.

Primary Data Collection

I also collected primary qualitative data via semi-structured interviews and focus groups to address research questions one and two. I collected data from four distinct populations at the same public Ohio university – deciding students, recent major switchers, senior students, and academic advisors. All of the interviews and focus groups were recorded on a digital recording device. The audio recordings of a few of the first round of deciding student interviews were transcribed in house by the author. The remainder of the audio recordings – first and second round of deciding student interviews, focus groups with major switchers and graduating seniors, and interviews with academic advisors – were transcribed by Rev², a professional transcription service. Accuracy of the Rev transcripts was spot checked and found to be of a similar quality to the author’s own transcriptions.

Analytic Methods

This section will detail the analytic methods that have been used in the analysis of the secondary and primary data detailed in the previous section.

Quantitative Analysis

Quantitative analysis was used to answer the third and fourth research questions. In this section, I describe the quantitative methods that I used to analyze the data from the previously described secondary data sources. These methods varied based on the outcome variable of interest.

Generally, I used descriptive regression modeling to explore the third and fourth research questions. I used similar analytic methods to explore these two questions because the dependent

² See www.rev.com for more information
variables are similar. In both cases, I was interested in the effects of independent variables on time to degree completion and probability of graduation. As previously discussed, no researcher (including myself) has found a causal inference method to fully deal with the inherent selection bias that is present when examining the relationship between major selection behavior and student outcomes. Thus, descriptive regression modeling is undertaken here, with the results supported by the rich qualitative information from the interviews and focus groups.

The BPS data was the primary source of the analysis for the third research question and the findings from this analysis are applicable on a national level. The detailed nature of the specific university data allowed for a more robust analysis that can provide more detail to the findings for research question number three. The university data was the primary source for analysis for the fourth research question as it allowed for the semester-by-semester observation of initial major decisions and major switches, in addition to observing the actual major selected opposed to the broader categorization included in the BPS.

The regression models examining time to degree completion were restricted to only students who earned their degree, as it is impossible to observe time to degree for those students who never graduate. The relationship between time to degree completion and several independent variables was explored using a generalized linear regression model (GLM) that included appropriate controls for ability, family background, prior academic achievement, and chosen major. These results were analyzed to determine whether initial major choices and the choice to switch majors once or more than once have a significant association on the average time to degree. This approach was applied to both the nationally representative BPS data and the more detailed university data. A duration (or survival) model was considered for the time to degree analysis, but was ultimately considered unnecessary because of a low amount of censoring of the outcome in the data. For the most part, very few students in the BPS data remained enrolled at the final longitudinal observation at the end of their sixth year. The vast majority of students had either graduated or dropped out by this point. For the university data, observations are recorded at the end of each semester, allowing for complete visibility of the outcomes except for all graduates.

The semester by semester structure of the university data allowed for a detailed analysis of the effect of timing of a student’s initial major choice and the effect of the timing of the declaration of the student’s final major choice (meaning the major that the student graduates with). In addition, a longitudinal model using the panel structure of the university data was used to analyze factors that could predict a student major switch in future semesters.

The other main dependent variable of interest is the effect of major selection and major switching behavior on the probability of graduation. The approach for these models will be exactly as described for the time to degree analysis, but the model specification will change to suit the structure of the data. Since graduation is a dichotomous variable, a logit regression structure will be used, but the independent variables will remain the same as the previous model.
Qualitative Analysis

The qualitative information collected via focus group and interviews was analyzed using qualitative coding techniques. This analysis was the primary method to explore the first and second research questions. An initial codebook was developed concurrently with the interview and focus group protocols and was refined as themes emerge during the coding process. The coding process took place in two rounds. The first round coded the transcripts in concert with the themes asked about in the interview protocol. After reviewing the results of the initial round of coding, codes for emerging themes were added to the codebook. A second round of coding was undertaken on each transcript to ensure that every one had been reviewed for the presence of emerging themes that were identified during the first round of coding.

The software package Dedoose was used to ease the coding process and to help identify emerging or common themes and the range and frequency of the responses from the different populations of interest. The longitudinal structured elements of the interviews with undecided students were analyzed for changes over time. Once the data are coded, I assessed the themes found within each population and synthesized the findings. An example of this synthesis, for instance, is a comparison of the description of the information provided by academic advisors with the information that students report to be most useful to them in making a major decision.

Policy Scan & Policy Implications

To inform the policy implications of this work, I conducted a scan of policies in place at the university and state level regarding major choice, looking for the range of policies in the area and the prevalence of the more common policies. A review was undertaken of university policies specific to initial major selection, undecided students, and major switching. Exemplars of each type of policy are discussed in detail in the policy scan chapter later in this dissertation. Finally, a review of broader policy, including state policies and efforts to encourage students to choose particularly types of majors was also conducted.

Ultimately, this dissertation synthesizes findings from all of the above research efforts to develop policy implications that can inform colleges and universities seeking to ease the major selection process and help students make better major choices, potentially helping them graduate more quickly and at a higher rate.

Organization of the Dissertation

This dissertation is divided into eight chapters. This chapter introduces the work and the research questions and provides an overview of the research methods. The next chapter, Chapter Two, summarizes the research done to date on major selection behaviors and provides a conceptual model of higher education choices. Chapter Three describes the analysis of nationally representative data and describes the relationship between major selection behaviors and student outcomes.
The next three chapters comprise the results from the in-depth case study conducted at an Ohio public university. Chapter Four discusses major decision making from the perspective of the students and includes the results from the deciding student interviews and the focus groups with major switchers and seniors. Chapter Five shares the perspectives of academic advisors that work with major selecting students. The results of the quantitative analysis of the university specific data is found in Chapter Six. The seventh chapter includes a discussion of current university and other policies dealing with major selection. The dissertation concludes with Chapter Eight, which summarizes findings from the rest of the dissertation and discusses the policy considerations of the work.
Chapter Two: Literature Review and Conceptual Models

Overview

This chapter shares the results of a comprehensive literature review of all relevant works, setting the foundation for the rest of the dissertation. This informs the answers for several of the research questions and provided important parameters and defined key measures for other research questions. I also use this review to identify gaps in the research and briefly discuss where this dissertation contributes to the knowledge base.

This chapter summarizes information from the existing literature on the following questions:

- How do college students choose their major?
- What majors do students choose and what is the impact of those choices?
- Why do students change their majors?
- How much major switching occurs and what is the effect of this behavior?
- Are their differences in major choice and major switching behavior between demographic groups?

Chapter Two concludes with the discussion of some conceptual models of higher education decision making and a summary of the chapter that includes a discussion of potential gaps in the literature and how this dissertation will contribute.

How do Students Choose their Major?

Comparisons of Different Major Selection Systems

Major selection policies vary widely between American universities in terms of advising, required timelines, and freedom of movement between schools within a university (moving from a college of business to a college of engineering for example). However, these policy differences pale in comparison to differences between systems internationally. If viewed as a spectrum from open choice to totally inflexible, the United States is on the open choice side with very flexible major selection policies and the ability to change majors with few restrictions. Compare this to the system in Chile where the students apply directly to a particular university and major combination in a centralized application system used by the all of the universities in the country. If a student in Chile wants to change his or her major, he or she would essentially have to go through this system again to reapply to the newly desired university/major combination (Hastings, Neilson and Zimmerman, 2013). This is undoubtedly on the inflexible side of the spectrum of major selection policies. There are a handful of papers that analyzed the effects of the different regimes on student welfare.
One of these papers, by Bordon and Fu, conducted a welfare analysis of the different major selection regimes. They found that forcing students to choose their college and their major by admitting students to specific college/major combination, as currently occurs in Chile, gives a higher potential for a student/major mismatch. The authors found that switching from a Chilean model to an open major choice system like the one that is in place in the United States would increase student welfare by one percent. This improvement in welfare was found to be even more pronounced for low income, low ability, and female students (Bordon and Fu, 2015).

Another recent paper from Bridet and Leighton examines the tradeoff between the additional occupation-specific skills that are obtained with early major choice versus additional time of multidisciplinary study. Early major choice was thought to allow for more credit hours to be focused on major-specific skills that apply to the occupations tied with particular majors. On the other hand, later major choice allows for a longer exploratory period that gives students more time to discover their particular area of competitive advantage. Switching from an open major choice model like the one that is in place in the United States to a required early major decision, as is the case for many European systems, would cause expected earnings to fall by 1.5 percent (Bridet and Leighton, 2015).

**Determinants of Major Choice**

Students select a college major for many reasons. Relative to other aspects discussed in this dissertation, these personal determinants of major choice are fairly well studied. Much of the literature comes from economics, motivated by the potential labor market impacts of the choice of major by college students.

Several papers explore the influence of expected earnings of careers associated with different majors. Beffy, Fougere, and Maurel examined this influence in their 2012 paper. As with much of the work on college major selection, they estimated a dynamic model of post-secondary decision making. Using administrative data from French universities, they found that expected earnings had only a small effect on major decision making. Instead, major choices were largely driven by non-monetary considerations such as student ability and preferences for certain type of school work (Beffy, Fougere and Maurel, 2012).

Other papers regarding the role of expected earnings are very recent. Wiswall and Zafar published two papers on this subject in 2015, both data collected from a non-representative sample collected from a group of high-income high-ability students at New York University. The first simply examined the role of expected earnings in major decision making. They found that earnings expectations (along with perceptions regarding their own ability) play a big role in a student’s major decision making. However, they found that major decisions were largely driven by major-specific and unobserved tastes. They explained that this includes enjoyability of the coursework and the non-pecuniary aspects of careers associated with particular majors (Wiswall and Zafar, 2015a).
Wiswall and Zafar’s second 2015 paper used a novel information experiment where a similar sample of high ability high income New York University students were surveyed, provided with additional information, and then surveyed to see how responses changed in response to the new information. This longitudinal structure of the instrument controls for the influence of individual tastes by differencing them out with repeated observations. The first round of surveys asked students about their beliefs regarding expected earnings associated with certain majors and their probable major choices. They were then provided with information on the true population statistics on average earnings associated with different majors. Students were then surveyed again in regarding their beliefs on expected earnings. Students provided with the true population statistics on earnings revise their beliefs regarding expected earnings associated with different majors and move their likely major choices towards higher earning majors. However, they did find a substantial amount of heterogeneity in the responses to the additional earnings information. One of the most notable findings of this paper was there were large differences between the students’ beliefs of what the expected earnings associated with different majors and the actual expected earnings. These large errors, especially when considering the high ability sample that might be more likely to have more accurate beliefs, suggest that information interventions such as this one would provide benefits to students at a low cost (Wiswall and Zafar, 2015b).

One of the few studies of any kind to use detailed major descriptions as opposed to binning different majors into wide groups, Long, Goldhaber, and Huntington-Klein put together a trove of data from several sources. These included the IPEDS transcript database from the National Center for Education Statistics, the Current Population Survey, administrative data from the public universities of Washington state, and state level unemployment insurance data. They found that there was a statistically significant relationship between the changes in average wages by occupation and college major selections in related fields from the period from 1982 to 2012. Students were more likely to respond to localized changes in average wages (such as those at the Washington state level) compared to changes in national averages. Completed majors were influenced most by the average wages prevailing during their freshman year, suggesting that any information interventions should be delivered early in a student’s career. Interestingly, major selection responses to average wage information was largest for majors that are most closely tied to particular occupations (Long, Goldhaber and Huntington-Klein, 2015). Synthesizing the work from the various papers, it appears that expected earnings in careers associated with different majors play a role in the college major decisions of students, but it is not a major driver behind these choices.

Individual preferences are thought to be a large part of a college student’s major choice and this hypothesis has been well studied. In his paper on students sorting by ability into different college majors, Arcidiacono found that personal preferences for certain majors and the coursework that comes with it were the primary factor in the ability sorting. Personal preferences for careers associated with certain majors were also a small factor in this phenomenon.
Altonji, Blom, and Meghir found in their 2012 paper that individual preferences were a major influence on major choice, along with ability, previous preparation, and future earnings (Altonji, Blom and Meghir, 2012). Zafar’s 2013 work found that preferences for enjoyability of coursework and gaining parental approval were the most important determinants of major choice (Zafar, 2013).

Other personal characteristics have been examined as possible determinants of major choice. Math ability was found to be important for sorting into different majors, but verbal ability has little association with major choice. Reuben, Wiswall, and Zafar examined whether personal levels of competitiveness or self-confidence had an influence on major choice and they found no association (Reuben, Wiswall and Zafar, 2015).

In summary, tastes and preferences are a large determinant of college major choice. Expected earnings, labor market outcomes, and ability levels are also significant factors. Other factors found to determine college major choice include parental influence and previous academic preparation.

What Majors do Students Choose and what is the Impact of those Choices?

There is a long history of academic work that describes what majors college students are choosing. There are several national representative data sets from which national breakdown in major selection can be discerned. One key source of national college major choice data is the Beginning Postsecondary Students Longitudinal Survey (BPS) administered by the U.S. Department of Education. Descriptive analysis of the most recent complete cohort of the BPS (2004-2009) by Chen in 2013 concentrated on the choice of science, technology, engineering, and mathematics (STEM) majors. 28 percent of bachelor’s degree students entered a STEM major at some point in the 6-year period after entering postsecondary education. Life sciences were the most popular STEM field with 11 percent of students selecting a life science major of some sort. The least popular choice was mathematics with 2 percent of students, followed by physical sciences with 3 percent of students (Chen, 2013).

In a six-year observation period after enrollment, 48 percent of the students that chose STEM majors had switched out of STEM. Roughly half of these students switched their major to a non-STEM field and the other half dropped out of school entirely (Chen, 2013). When surveyed, students are open to STEM degrees as they are of any other, but relatively few students end up finishing with a STEM degree. Ultimately, students are selecting STEM majors at a rate that is in line with their abilities as they come into school (Stinebrickner and Stinebrickner, 2013).

There are large differences in the financial returns of different college majors and in other academic outcomes of interest like graduation rates and time to degree. Most of the papers here group majors in four or five large groups. This eases estimation of the models in the paper, but limits the fidelity with which the findings can be interpreted. One such paper from Arcidiacono
grouped major choices in to four groups – natural sciences, business, social science/humanities, and education. He found that there are large earnings differences across the major groups. This coincided with large ability differences in different major choices. In particular, lucrative majors (natural sciences and business) drew students with high math abilities. Even after controlling for selection and these ability differences, there are large earnings premiums for certain major groups (Arcidiacono, 2004).

Another more recent paper used a similar major grouping scheme to compare lifetime earnings of graduates from different majors to each other and to lifetime earnings of high school graduates with no college experience. Webber found that there is a large degree of heterogeneity in the lifetime earnings premia (meaning the additional earnings for graduating in a major compared to the earnings of a no college high school graduate) across all majors. Business majors and STEM fields have the largest earnings premia and arts and humanities majors have the smallest earnings premia. The STEM earnings premium is more than double that of arts and humanities majors. While this difference in earnings premia between majors is very large, there has been a small degree of convergence over time (Webber, 2014). Altonji, Blom, and Meghir found that differences in returns across college majors rival that of the wage premium of a college degree over a high school degree, highlighting the importance of college major in future life outcomes (Altonji, Blom and Meghir, 2012).

There are also differences between different majors in non-monetary and academic outcomes of interest like persistence, time to degree, and graduation rates. A 2011 paper found that there are different completion rates for different majors. Those majoring in business and the social sciences were more likely than average to graduate in four, five, and six years than average. Students majoring in engineering and health related majors were less likely to graduate in four, five, and six years. (DeAngelo et al., 2011) A poor choice of major in college can be a significant contributing factor to the decision to drop out of college. (Montmarquette, Cannings and Mahseredjian, 2002) College majors serve as prerequisites for occupational path and choice of major clearly limit future career choices (Altonji, Blom and Meghir, 2012) (Altonji, Arcidiacono and Maurel, 2015).

Why do Students Switch Majors?

One might expect the reasons to switch majors to be similar to determinants of the original college major choice. However, students that change their major have gained additional information about their own abilities and potential areas in which they have competitive advantage over their peers. How this additional information stemming from college experiences come into play with respect to college major decision-making is a fairly new line of research, but has been studied in a few recent works. Much of this work concentrates on attrition from STEM majors, but switching behavior in other majors also was studied as part of most of the studies discussed here.
The paper described earlier by Chen is an example of a paper that concentrates on STEM switching. The intensity of STEM course taking in the first year, the type of math courses taken in the first year, and the academic performance in STEM course all were associated with the rate at which a student switches out of a STEM major. Taking light STEM course loads in the first year of studies, taking less challenging math classes during the first year, and poor academic performance in STEM classes relative to academic performance in non-STEM classes are all associated with switching from STEM majors to non-STEM majors (Chen, 2013).

Another paper that concentrates on science majors is one from the brothers Stinebrickner in 2013. In this paper, they found that students switching out from a science major have typically learned that their grade performance in science was worse than expected, which reflects revealed information about their ability. Students who don’t start in science switch into science majors at a lower rate. This is thought to be because these students do not learn that they are talented in science if they don’t have the opportunity by taking science classes. Students update their beliefs about future major-specific grade performance by taking courses in that area. Taking courses in science was shown to be the primary way to learn about one’s ability in science. Thus, requiring more science courses early during college could lead to more science graduates (Stinebrickner and Stinebrickner, 2013).

Arcidiacono found that poor academic performance was associated with dropping out of college or switching to a less lucrative major (Arcidiacono, 2004). Another paper looked at the influence of academic performance on major switching from an interesting angle. This 2015 paper from Sjoquist and Winters studied college students from Georgia, where there is a statewide scholarship program with wide participation known as the Hope Scholarship. To maintain the scholarship, students must maintain a minimum GPA. It was found that there was evidence of scholarship holders switching majors to less difficult majors as their GPA approached the GPA level required to maintain the Hope scholarship (Sjoquist and Winters, 2015).

A counter example, albeit one that focused on decisions to major in economics, found that high letter grades in introductory economics classes did not influence the decision of a student’s to major in economics (Main and Ost, 2014). Nevertheless, it is fairly well established that knowledge about domain-specific ability is revealed through course taking and poor performance in major classes reveal a lack of ability in the subject in which they receive poor grades. Poor performance is associated with major switching into easier majors.

Beyond their absolute personal academic performance, students take their performance relative to their peers into account as well. Peer effects have been a popular area for research in higher education and this has extended in the major choice sphere. A 2015 paper by Luppino and Sander look at peer effects in the terms of a student’s reaction to their relative ranking in their major. For non-science majors, they found that peer quality has a positive effect on cumulative GPA and whether a student chooses a science major. Students who attend more selective schools
that have stronger peers in the sciences are less likely to graduate with a science degree (Luppino and Sander, 2015).

Another paper examines peer effects on initial specialization choice of students in Russia. I include this paper in this section because the specialization choice in Russia is made during the third year. This timing of this decision is more similar to the timing of a major switching decision in American universities. In this paper, the authors use information on individual social ties from a survey to conduct peer network analysis. Specifically, the study looks at ties from randomly assigned study groups and social connections that were formed over time during the first two years of university. Both friends and randomly assigned study partners were found to affect the specialization choice of students. The strongest effect is from friends who are also in the same study group and from peers with similar academic standing. Reciprocal ties (meaning both people identified each other as friends) have a bigger impact on specialization choice that non-reciprocal ties (meaning where one person identified another as a friend, but the second student did not identify the first as a friend) (Poldin, Valeeva and Yudkevich, 2015).

In summary, work on determinants of major switching has concentrated on the role of academic factors such as academic performance and course taking patterns. Academic performance in particular reveals information about major-specific ability to a student and poor performance is associated with major switches. Peer effects also appear to play a role in the selection of majors and switching majors once enrolled.

How Much Major Switching Occurs and What is the Effect?

Major switching is an extremely common behavior, but effects of major switching behavior are not well studied. This section of the literature review describes the prevailing patterns of major switching behavior and the potential effects of major switching on outcomes of interest, academic or otherwise.

A 2015 paper by Reardon and others analyzed the academic records of students from a major university that matriculated between 1994 and 2002. The average number of major changes per student over this time was 2.64. In this paper, they found that additional major changes were associated with higher graduation rates, which could be considered an unintuitive result. However, they did not account for the fact that those that persist in college have more opportunities to change major and this additional persistence is highly correlated with higher graduation rates. Thus, the association between major changes and higher graduation rates may be confounded by this phenomenon (Reardon et al., 2015).

Arcidiacono, using data from the 1972 cohort of the National Longitudinal Survey of Youth, studied major switching behavior in his 2004 paper. This paper grouped majors into four broad categories, so the major switches here are switches in majors between groups. A switch from Chemistry to Biology was not considered as a switch in major in this analysis, so it could be considered to be a study of potentially “high-cost” major switches, as it only concentrates on
switches between largely unrelated majors. He found that natural science majors were the least likely to stay with their original major choice, but they were also the least likely to drop out (as opposed to staying in school and changing majors to another field). Interestingly, ability sorting between majors continues to happen as students switch majors. Natural science majors that switch to business have a lower average math SAT score than business majors that switch to natural science. This pattern continues across other majors as well. This may be evidence for comparative advantage as those with high math scores relative to verbal scores are more likely to choose natural science majors. In an estimated utility function, the cost of major switching was very high (perhaps reflecting the fact that he only studied switches between major groups), although these costs were significantly lower when switching into social science/humanities (Arcidiacono, 2004).

Other papers also found that science majors are quite likely to switch majors. Students are more likely to leave science majors if they started with one and they are also less likely to switch into a science major if they started with another non-science major (Stinebrickner and Stinebrickner, 2013). Another paper reported that 48 percent of students that are initially in STEM majors switch out, with half dropping out of college entirely and half switching to another non-STEM field (Altonji, Arcidiacono and Maurel, 2015). Chen provided nuance to this finding, showing that high performing STEM majors were more likely to leave by switching into another non-STEM majors and low-performing STEM majors were more likely to leave by dropping out of school entirely. Also, students at public universities were more likely to switch out of STEM majors than students at private universities (Chen, 2013).

An interesting paper from Bahi, Higgins, and Staley in 2015 used a time hazard model to estimate the semester by semester risk of major switching for math majors. While this paper only looked at mathematics and mathematics education majors at one university, this type of approach is one that is interesting from a policy perspective as it sheds light on the times of peak switching behavior, which could be used to target interventions. They found that there was a 23 percent probability that a math major would switch out in the first semester enrolled and this probability reduced to 20 percent in the second semester. From there, the risk of major switching decreases in a fairly linear fashion as students persist in the math major to a low of a 4 percent probability of switching major in the eighth semester. The ninth and tenth semesters (which would correspond to a student’s fifth year of enrollment) did not have a major switching risk that was significantly different than zero. They also found that the probability of switching was lower at all stages for mathematics education students as opposed to mathematics majors (Bahi, Higgins and Staley, 2015).

Switching majors in response to new information about ability, preferences, and returns to different majors is costly, but these costs vary by school due to policy differences and the set of majors offered at particular universities (Altonji, Blom and Meghir, 2012) (Altonji, Arcidiacono and Maurel, 2015). The limited set of majors at a particular university can limit responses to changes in the labor market or induce the even larger cost of a transfer to another university.
However, there are other costs besides labor market outcomes to consider the full cost of major switching, like the effect on graduation rates and increased time to graduation (and the additional tuition that comes along with it). There also may be heterogeneous effects across majors as major switches may delay graduation in some majors more than others. However, some students may find it optimal to switch, particularly students who do not perform as well as expected in a particular major and thus revise their major-specific ability estimate downward (Altonji, Arcidiacono and Maurel, 2015).

The timing of switches is important as well; Major switches later in one’s college career may delay graduation more than earlier switches (Altonji, Arcidiacono and Maurel, 2015). A descriptive analysis from Western Kentucky University in 2012 that does not control for selection bias also finds evidence of the timing effects of major selection and switching behavior. Students who began undeclared but declared by the end of the second year graduated at a higher rate and more quickly than others (including those that declared a major prior to entry), but this advantage deteriorated quickly if the initial major choice was made in the fifth semester or beyond. Early major changing in the first two years of school had no negative impact on student success, but changes that occurred after the second year correlated with lower GPA, lower graduation rates and longer time to complete for those that graduated (Foraker, 2012).

In summary, major switching is an extremely common behavior. In fact, the average student in one study was found to have changed their major nearly three times. Students in STEM majors are particularly likely to switch their majors and few people switch into STEM majors from non-STEM fields. Switching majors can be costly in several ways. First, there are more immediate costs in terms of effects on graduation rates and the additional tuition and opportunity cost that comes with the additional time to degree that major switches are associated with. Also, there are vast differences in the projected lifetime earnings associated with different majors and there can be a large cost associated with switching from a lucrative major to a relatively low earnings major.

Are their Differences in Major Choice Behavior between Demographic Groups?

There is a great deal of interest in differences in higher education behavior between different demographic groups. At times, this is motivated by gaps in labor market outcomes between two groups (the gender gap in wages, for example) and at other times motivated by gaps in more proximal outcomes such as persistence in college, graduation rates, or time to degree. This section will look at differences in major choice, major switching, and associated outcomes among genders, races, and socio-economic status. It also looks at differences between first-generation college students (meaning students who are the first members of their families to attend college) and students whose parents have attended college.
Gender

Gender is the most well studied of the demographic categories regarding differences in college major selection and major switching behavior. As previously mentioned, differing career choice (and major choice, as it serves as a conditioning factor for career path) between males and females is one of the factor thought to drive the gap in average wages between males and females (Turner and Bowen, 1999).

Differences in major choice between genders may explain differences in skills brought to the labor market by each gender and may partially explain observed differences in wages. Differences in the major choice patterns of men and women have persisted over time. Differences in academic preparation between the genders explain some of the lack of convergence between the major choices by gender, but it appears that preferences for different majors are the driving force behind the divergent choices of majors by gender (Turner and Bowen, 1999). One pattern that has changed over time is dichotomy of science/non-science selections. There are certain subsets of science majors that have been growing more popular with women and others that have remained unpopular with women. Women have a high participation rate in life science majors in undergraduate postsecondary education, but much lower in other categories like mathematics, physical science, and engineering (Turner and Bowen, 1999).

A 2014 paper from Gemici and Wiswall echoed the results from this earlier paper which analyzed a novel data set using Current Population Survey data augmented with data from the National Survey of College Graduates. They found that women have reached parity with men in terms of college graduation rates, but that there is a large gender difference in college major choice. Women are two thirds as likely as men to earn a degree in a science or business field. These gender differences were found to be largely driven by differences in tastes and preferences as opposed to differences in skills (Gemici and Wiswall, 2014). A recent paper that surveyed high ability students from New York University found that males are 82 percent more likely than women to select business or economics as a major and women are 62 percent more likely than males to select a major in the humanities (Reuben, Wiswall and Zafar, 2015).

Since there are observed differences in the actual outcomes, it follows that the determinants of initial major choice for females differ from those of male students. Women have been found to be less influenced by the expected earnings associated with different major choices compared to men (Montmarquette, Cannings and Mahseredjian, 2002). Zafar’s work in 2013 directly addressed the gender differences between the major choices of males and females. He surveyed 161 high ability sophomores at Northwestern University that were active major choosers. Preferences for enjoyable coursework and parental approval were the most important determinants for both genders, but males and females were different in regards to the preferences for the potential workforce outcomes of their major choices. Males cared more about monetary outcomes than females. Females were more sensitive to non-pecuniary outcomes like preferences for enjoyable work and the ability to reconcile work and family than males. Thus the gender gap
in major choice was mostly due to differences in tastes and preferences (Zafar, 2013). When specifically studying gender differences in the choice of a science major, gender differences in work-life attitudes and in academic preparation and performance explain only a small portion of the gender gap in the choice of a science major (Morgan, Gelbgiser and Weeden, 2013).

There is very little work on gender differences in major switching behavior, despite the potential labor market consequences of differential behavior. Chen found that female and male students switch out of STEM majors at similar rates (Chen, 2013). In work that looked at major switching behavior in high-ability students at Duke University, females that initially majored in the natural sciences, economics, and engineering were more likely to switch out to another field than men (Arcidiacono, Aucejo and Spenner, 2012).

In summary, there are notable differences in the major selection patterns between genders and this difference may account for some of the wage gap between genders. Women are less likely to select a science major than men and are more likely to select a humanities major. Women are less influenced by the expected earnings of particular major than men and are more influenced by non-pecuniary workplace outcomes associated with different majors than men. There is mixed evidence on gender differences in major switching behavior.

**Race or Ethnicity**

Despite a large general interest in racial disparities in postsecondary education, differences in major selection behavior has not been well studied recently. There is a minimal amount of work on differences in the determinants of major choice between whites and minorities. Specifically, non-white students were found to be less influenced by expected earnings than were white students (Montmarquette, Cannings and Mahseredjian, 2002).

There are two high quality papers that explore major switching behavior of minority students and compare that behavior to that of white students. The first is a recent study of peer effects on major selection by Luppino and Sander. They found that weaker (in terms of academic performance) non-minority students typically react to peers that are stronger in the sciences by switching majors. Minorities in this situation tend to persist in the selected science major regardless of peer quality. Due to this behavior, the minority students suffer substantially in more competitive programs in terms of GPA and the probability of receiving their degree (Luppino and Sander, 2015).

A paper from Arcidiacono, Aucejo, and Spenner in 2012 specifically looked racial differences in major switching behavior. They used student data from Duke University (an elite private school with mostly high ability students) that includes only students from the college of arts and sciences and the school of engineering. 54 percent of black male students originally interested in the natural sciences, economics, or engineering switch out to a humanities or social science major compared to less than eight percent of white men. This same pattern holds for females but is less dramatic. 33 percent of white women interested in these fields switch out to a humanities or social science major compared to 51 percent of black women initially interested in
natural sciences, economics, and engineering. Upon graduation, 68 percent of black students end up majoring in humanities and social sciences compared to less than 55 percent of white students. At Duke, there is a GPA gap between white students and black students that narrows over time as students move forward in their career at the school. The differences in major switching behavior accounts for entirety of this reduction in the GPA gap between white and black grades over the college career. This is due to the fact that average grades in the natural sciences, economics, and engineering are 8 percent lower than the average grades in humanities and social sciences. As more black students switch to humanities and social sciences, the gap in GPA reduces in size (Arcidiacono, Aucejo and Spenner, 2012).

In summary, non-white students are less sensitive than white students to expected earnings when making their major choices. The two papers on major switching behavior are mixed, possibly due to the differences in population and settings. However, both papers found that there were differences in major switching behavior between minority students and white students.

**Socio-Economic Status**

Differences in higher education behavior between students of different socio-economic backgrounds have been highlighted recently by influential papers by Hoxby, Avery, and Turner. These papers discussed the choice of which college to apply to and ultimately attend of high-achieving low-income students. The first by Hoxby and Avery shows that there is evidence of high ability low income students applying to selective colleges at a lower rate than higher-income students with similar ability. This was true even though the selective schools typically offered more generous financial aid packages and thus cost these students less than non-selective schools. (Hoxby and Avery, 2013) The follow-up paper, this time from Hoxby and Turner, studied an intervention designed to impel high ability low income students to attend more optimal universities for them. They conducted a randomized controlled trial where the treatment group was provided information on applications and the net costs (including financial aid) of different colleges along with application fee waivers that allowed the students to apply to more schools without additional costs. This intervention was shown to be successful in getting the treatment group to attend colleges with greater resources and higher graduation rates (Hoxby and Turner, 2013).

These papers do not discuss major selection specifically, but they do demonstrate that there are barriers facing students with lower socio-economic status and gaps in information exist that could lead to suboptimal decision making. There are a handful of papers that analyze differences in major decision-making by socio-economic status specifically. They tend to support the idea that that higher education decisions of low-income students are vary significantly from the decisions of high-income students. A 2013 study of British university students showed that students from lower income households were less likely to choose a high wage premium major compared to higher income households, even after controlling for other factors. The authors postulated the propensity to select lower paying majors could temper the social mobility of
member of lower income household despite the increasing access to postsecondary education for lower-income groups (Davies et al., 2013). In terms of major switching behavior, low income students have been found to switch out of STEM majors at a lower rate than higher income students (Chen, 2013).

First Generation College Students

A first-generation college student is one whose parents did not attend college. The higher education decisions and outcomes of these students are of great interest as first-generation students have been shown to be in a disadvantageous position compared to their peers with college going parents. First generation students can be seen as a proxy for students with low amounts of information about college and how to navigate the complexities of the experience – the application process, selecting a major, and facing the tradeoff of immediate earnings in the labor market compared to the future earnings premium from a college degree.

For major selection specifically, a detailed descriptive analysis of the major selection behavior of first generation college students was carried out by Chen in 2005. First generation students were more than twice as likely to enter school undecided about their major, supporting the idea that first generation students arrive with less guidance about their college careers. When they did pick a major, first generation students were more likely to pick a vocational field (such as education or nursing) compared to students whose parents had a bachelor’s or master’s degree. Students whose parents held a postsecondary degree were more likely to select a major in STEM fields, architecture, arts and humanities, or the social sciences (Chen and Carroll, 2005).

Conceptual Models

This section synthesizes some findings from the preceding literature review to develop a conceptual model for higher education decision making, concentrating on the decision on what subject to major in. In order to explore how students choose their major, it is important to view the choice of major as a part of a larger choice set that a student must make as they are starting their college career. There are several postulated theoretical models that describe the decision-making process of college-going students, but the most prominent model in the literature is one put forth by Arcidiacono in 2004 and then built upon by Altonji, Arcidiacono, and Maurel in 2015.

Both of these papers fit a dynamic model of college and major choice. Students make an initial choice of college and major field of study (or remain undecided on major). As students attend class and experience college, they receive additional information about their abilities and their preferences and tastes. Students then use this additional information to update their original decisions. They can do this by staying their current course, changing their major, changing their
college, or entering the labor force (in other words, dropping out of college) (Arcidiacono, 2004) (Altonji, Arcidiacono and Maurel, 2015).

Based on this dynamic model, I have developed a conceptual model of the higher education decision making process, shown in Figure 2.1. After graduating from high school, students have a choice of entering the labor market or choosing to obtain additional schooling. Since this dissertation concentrates on decision making in the four-year university environment, the model begins at the student’s initial decision to seek a bachelor’s degree. The first step for these students is to choose what college they want to attend and what major to select. The dotted line between these two options represents the fact that these decisions may condition each other. Some students will be sure of their major choice and will choose colleges conditioned on offering this particular major. Others will choose their college first and then decide their major from the offerings of the chosen institution. In this model, entering college undecided on a major is a considered a major decision in and of itself.

Students then matriculate in college and begin their college career. As they take classes, speak with advisors, and experience life in the college environment, students learn about their ability in different subjects and their preferences for different types of coursework. During this time, students reflect on their current postsecondary choices and periodically (perhaps every semester) reassess them. Students have a choice to maintain their current path, change their major, change their university, or drop out of college and join the labor force. Those that choose to change their university will start over at the beginning of this model. Decisions to transfer to another university are beyond the scope of this dissertation, but with the realization that it can be involved in the major decision making process. Joining the labor force is the ultimate outcome of this model whether a student receives a degree or not.

If a student chooses to maintain the status quo or change their major, the student will continue to gather information about major-specific ability and preferences and the student will again reassess and face the same four choices again. Eventually, a student exits the model by entering the labor force by dropping out of college or hopefully receiving their bachelor’s degree. I have used quantitative methods to look at the effect of major changes on graduation and the time to degree and qualitative methods to look at initial major decisions, the reflection period, and the action period.
Since this dissertation will concentrate on the major decision process specifically, I have also developed a conceptual model of the major decision process, shown in Figure 2.2. Once a student decides to attend college, they start the major decision process by generating a choice set of potential majors. This choice set depends on the majors offered by the college of choice, the preferences and interests of the students, and the academic preparation of the student. The student would then select an alternative from the choice set and begin to take classes to move towards completion of the degree in the major of choice. As the student moves through their college career, they consistently evaluate their current major choice relative to other potential major choices. If a student elects to change their major, they would select one from the existing choice set from which they made their initial selection or generate a new choice set based on updated information and preferences.

Universities can involve themselves in part of the decision-making process in several ways. The most common way is through advising, but many universities provide information about majors prior to matriculation or have specific programs for deciding students. At the public Ohio university studied in detail in this dissertation, they have a robust set of activities for deciding students that includes career assessments, a required career and life planning course, and designated advisors trained specifically to help major exploration. Ultimately, a student drops out or sticks with their current major until they graduate and receive the intended degree.

In this dissertation, I used qualitative methods to explore how students generate their major choice sets and select from this list of alternatives. I also looked at the how students evaluate their current major and what criteria they use to do so. I also spoke to advisors about how they
intervene and advise during the different stages of the major decision making process. The research design used to do this is described in detail in the next chapter.

Figure 2.2 – Major Decision Making Model

Summary

The purpose of this chapter is to inform the reader of previous academic research regarding college major selection in an effort to provide background knowledge and context to the discussion that follows in the rest of this dissertation. This chapter provides a theoretical background of how students arrive at their choice of major followed by a review of the factors that are used by students to determine their choice of major. In summary, tastes and preferences are a large determinant of college major choice. Expected earnings, labor market outcomes, and ability levels are also significant factors. Other factors found to determine college major choice include parental influence and previous academic preparation. Synthesizing the work from the various papers, it appears that expected earnings in careers associated with different majors play a role in the college major decisions of students, but it is not a major driver behind these choices.

Also, major switching is an extremely common behavior. Work on determinants of major switching has concentrated on the role of academic factors such as academic performance and course taking patterns. Academic performance in particular reveals information about major-specific ability to a student and poor performance is associated with major switches. Peer effects also appear to play a role in the selection of majors and switching majors once enrolled. Work on the costs of major switching behavior concentrates on the effects on labor market outcomes and lifetime earnings. One paper mentions the possibility of more proximal costs and the need for an estimate of these costs, but does not enumerate them.

My work in the rest of this dissertation will address this gap in the existing literature and a few others. Most work on major switching has concentrated on the important changes in lifetime earnings associated with switching between majors. The more proximal costs, such as additional
tuition and opportunity costs, that come with an extended time to degree are mentioned. This work will provide a descriptive estimate of these costs from two different sources. This work also closely examines the student experience of making an initial major decision through a longitudinal qualitative approach that involved speaking with students at multiple time points in their college careers, which will inform how factors and information used to make the decision evolve over time. It will also combine the internal thoughts of students with the external observations of the academic advisors that are guiding them through the major choice/switching process to give a unique two-sided approach to examining the issue. Both of these approaches will add a great deal of nuance and detail to the current research describing different steps of the major decision-making process, as described in the model in the preceding section. Specifically, it will add qualitative descriptions of the generation of the choice set along with more detail regarding the reflection and evaluation of the current major choice. These are areas where the current literature is certainly lacking. Lastly, this work synthesizes quantitative and qualitative evidence in one place, using the results of one to underpin the other. While the lack of papers using causal inference to tie major choices to student outcomes is not addressed by this dissertation, the descriptive quantitative results presented herein are supported by a rich qualitative exploration of the potential mechanisms behind those findings.
Chapter Three: Analysis of Major Selection Behavior Using Nationally Representative Data

Background

A student’s choice of major field of study in college and changes in this decision may have a significant impact on the probability of graduation, time of degree completion, and, ultimately, the cost of college. At many universities, more than 50% of students change majors at least once and a large fraction of these change multiple times. Despite the high prevalence of major switching, this phenomenon has seen little systematic examination. This section of the dissertation will quantitatively examine descriptive associations between major choice behaviors and student outcomes of interest. These outcomes of interest included the association between major choices and probability of graduation, the elapsed time from beginning college to degree, and satisfaction with the final major choice. Beyond the well documented differences in lifetime earnings between different major choices, changes in degree programs may lead to additional proximal costs in terms of additional tuition and additional time out of the labor force. As previously discussed, all models discussed herein are descriptive in nature, as there are no current approaches that will properly deal with the inherent selection bias present in these analyses. In lieu of causal inference, I have included as many controls for observable characteristics as possible and will use the upcoming qualitative analysis to augment this analysis and explore the potential causal mechanisms between major selection behavior and student outcomes.

Data and Methods

The analyses contained within use data from the 2004 cohort of Beginning Postsecondary Student Longitudinal Study. Participants are a nationally representative sample of approximately 19,000 students enrolling in postsecondary education for the first time in the 2003-04 school year. They were surveyed during their first year, the third year, and six years after entrance to collect the data that are analyzed here. Some variables are derived from information gathered from student transcripts. I restricted the data to those students that started their studies as first-time full-time students in bachelor’s degree granting programs at four-year institutions (N≈7,400). After removing students that had missing information for major switching behavior, the sample size is reduced to 6,880 students. There is some degree of missing information for many of the covariates used in the model, so the number of observations actually included in the analytic model can vary. All models use the included survey weights to ensure that the data are representative of the national population of students.
Three regression models will be described in this section. The first examines the relationship between major choice behaviors and the probability of graduation. This includes all students in the sample that met the inclusion criteria already described and those without missing data for included covariates. This model uses logistic regression to match the dichotomous structure of the dependent variable (a student either graduates or they do not). The second model examines the association between major switching behavior the elapsed time between starting college and graduating with a bachelor’s degree. By definition, this only includes those students who did persist long enough to ultimately graduate within the six-year period of observation, which included approximately 4,560 students.

The second model uses a generalized linear model was used to model the time to degree independent variable, which is represented by a count in months between enrollment and graduation. Time hazard or “survival” models were considered here, but were not employed due to the very small presence of censoring in the data and for ease of interpretation of the results. The third model returns a logistic regression structure to model the associations between major choice behavior and a student’s satisfaction with their final major at graduation, modeled as a dichotomous “satisfied or not” variable. All models include controls for a wide variety of covariates, including race, gender, ability (as measured by standardized test scores and high school GPA), whether or not a student earned any college credits in high school, family background characteristics, including the education level and national origin of parents, and initial and final major choices.

The count of major switch variable is likely somewhat conservative, as it includes only the major switches at a student’s most recent institution. Because major switching behavior is only available at the most recent institution, there is no information on major switching at previous institutions. Thus, any student that transferred institutions prior to completion is not included in any of the regression models presented here. The major switch count variable is not drawn from student transcripts, but rather from the survey information provided by the students, who were asked to recount how many times that they had formally changed their majors. The major switch count variable also only includes three categories – none, one, or two or more. Thus, I cannot examine whether there are differential effects between those that change majors twice or thrice for instance. All multiple major switchers are put into a single category, so comparisons will between non-switchers, single instance switchers, and multiple switchers.

Results

This section of the chapter will describe the characteristics of the sample and share the results of the three regression models.
Descriptive Statistics

As is shown in Table 4.1, students in the sample were 57.5 percent female, 27.8 percent of students entered college started college without a declared major, although this percentage was slightly lower among students that ended up changing their major later. 43.5 percent of students earned at least one college credit while in high school. 38.6 percent of students were first-generation college students³.

66.2 percent of students earned their bachelor’s degree at their originally enrolled institution. An additional 9.8 percent earned their bachelor’s degree at another institution after transferring. This leaves 24 percent of students who did not complete their bachelor’s degree in the six-year observation period. The vast majority of these students dropped out of school. However, there were a handful of students that were still enrolled seeking a degree at the end of the six-year period, so there is a tiny degree of right censoring present in the data. Among those students that graduated, the average students took 50.6 months to complete their degree. The typical bachelor’s degree program is designed to last around 45 months. There were also significant differences in the time to degree between different initial major choices. Students with majors in engineering (4.2 months longer), health (2.4 months longer), and education (1.7 months longer) took a significantly longer time to graduate than those students that entered undecided.

Table 4.1 – Descriptive Students Statistics by Number of Major Switches

<table>
<thead>
<tr>
<th>Number of Major Switches</th>
<th>Percent of Sample</th>
<th>Mean Months to Degree</th>
<th>Mean Standardized Test Scores</th>
<th>Mean Standardized High School GPA</th>
<th>Percent Female</th>
<th>Percent Undecided at First Term</th>
<th>Percent Earned College Credits in High School</th>
<th>Percent with At Least 1 Parent with a Bachelor’s Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>62.6%</td>
<td>49.55</td>
<td>1095.97</td>
<td>6.35</td>
<td>56.94%</td>
<td>28.14%</td>
<td>43.23%</td>
<td>62.00%</td>
</tr>
<tr>
<td>1</td>
<td>28.7%</td>
<td>51.75</td>
<td>1087.54</td>
<td>6.38</td>
<td>56.66%</td>
<td>27.67%</td>
<td>43.40%</td>
<td>60.17%</td>
</tr>
<tr>
<td>2 or more</td>
<td>8.7%</td>
<td>53.52</td>
<td>1081.26</td>
<td>6.33</td>
<td>64.20%</td>
<td>25.99%</td>
<td>46.00%</td>
<td>61.62%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>50.58</td>
<td>1092.22</td>
<td>6.36</td>
<td>57.50%</td>
<td>27.82%</td>
<td>43.52%</td>
<td>61.44%</td>
</tr>
</tbody>
</table>

Source: BPS 04/09
Note: N=6880, Mean months to degree only calculated for students that graduated. All other statistics include all students in the sample

The major choices of students over time are visualized in Figures 4.1 and 4.2. Degree programs were condensed into the categories shown based on the classification of instructional program (CIP) codes administered by the U.S. Department of Education. The percentage of

³ Defined as neither parent having earned a bachelor’s degree or higher. Students that have parents that have attended college, but did not graduate or hold an associate’s degree are included as first-generation here.
students that had declared a major within each CIP category is shown by the height of the bars in
the figures. The colors represent the survey at which the declared major was recorded. Thus, the
blue bars indicate the initial major choices of the students. The red bars are the major choices of
the students during their third years and the green bars represent their final major choice. The
only difference between the two figures is that the first contains all students in the sample and
the second contains only those students that graduated within the six-year observation period.
For students that did not complete their degree, their final major choice at the time of stop out is
recorded.

As is readily evident, there is great deal of variation in height between the bars for many of
the major categories, showing large changes in different levels of enrollment over time. For other
categories, the percentage of students enrolled stays relatively steady. Growth over time is
expected as the nearly 30 percent of students who begin undecided eventually decided their
major. Changes over time can be attributed to undecided students declaring a major in the
category or students switching their majors into or out of majors in that category. The
percentage of students that choose majors in categories that are normally considered as “STEM
majors”, which are often the most lucrative majors in terms of average lifetimes earnings
associated with them, do not significantly grow over time for the most part, with the exception of
life sciences. This follows the analysis by Chen, who used this data to look at the attrition of
STEM majors. (Chen, 2013) It appears that most students that begin undecided are selecting a
social science, humanities or a business major.

Figure 4.1 - Change in Major Distribution, all students

Source: BPS 04/09, N=6880
Probability of Graduation

The first regression model presented here will examine the associations between certain major choice behaviors and the probability of receiving a degree in the six-year period. As previously mentioned, a logistic regression model was used for this analysis due to the dichotomous nature of the dependent variable. This model, of course, includes both graduates and non-graduates, but it does not include students that dropped out prior to the 2006 survey. This is to account for the fact that students that persist for longer have additional opportunities to switch their majors. By restricting to the sample to those that persisted past the 2006 survey (N=5,170), each included student was enrolled for at least three academic years, leaving ample opportunities for all of these students to switch majors. Thus, associations between behaviors and outcomes described here do not pertain to students that did not persist for at least three years.

I find that, when controlling for a multitude of factors described in the methods section above, entering college without a declared major has no significant association with probability of eventual graduation compared to entering with any declared major, as shown in Table 4.2. I find that making one major switch is associated with a significantly increased graduation rate when compared to those that did not switch majors. Those students that made two or more major switches had no significant difference in graduation rates compared to those that did not switch majors at all. The average student with one major switch, all else held constant, had a graduation
rate that was 5.44 percentage points higher than the average student that never changed their major.

**Table 4.2 – Association of Major Choice Behavior with Probability of Graduation**

<table>
<thead>
<tr>
<th>Probability of Graduation</th>
<th>(1) Logistic Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Formal Major Switches</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>1.44***</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
</tr>
<tr>
<td>Two or More</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
</tr>
<tr>
<td>Undecided at College Entrance</td>
<td>1.22</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
</tr>
<tr>
<td>AME for Number of Formal Major Switches (percentage points)</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>5.44***</td>
</tr>
<tr>
<td></td>
<td>(1.5)</td>
</tr>
<tr>
<td>Two or More</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>(2.42)</td>
</tr>
<tr>
<td>Observations</td>
<td>5,170</td>
</tr>
</tbody>
</table>

Source: BPS 04/09

Note: Reported coefficients are odds ratios. Base level for “number of formal major switches” is zero major switches. Base level for “undecided at college entrance” is entering college with any declared major. AME = average marginal effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05

**Time to Degree**

The next regression model presented here examines the association of major selection behavior with the time to degree. To observe a time to degree, a student has to graduate, so this model includes only students that graduated within the six-year observation period. The model uses the elapsed time in months from enrollment to degree as the dependent variable, a somewhat awkward measure of time to degree. Nevertheless, the data source uses this as a measure to account for the fact that academic terms are different lengths and use different systems (quarters or semesters), which is an issue if using the more standard academic terms measure.

I find that major switching does have a statistically and practically significant association with time to degree, when controlling for a wide set of covariates. When compared to students that did not switch their major, a single major switch was associated with taking 2.25 months longer to graduate. Students that switch their major multiple times were associated with an increase of 4.37 months in time to degree compared to students that do no switch their major at all. These estimates are similar to saying an additional half semester in time to degree for single major switchers and a full additional semester for those that switch majors multiple times.
In a naïve model, students that start undecided appear to graduate significantly more quickly than those that enter college with a declared major. However, once you control for final major choice, there is no statistically significant relationship between entering undecided and time to degree, as shown in Table 4.3. This change is likely due to the fact that those that enter undecided are less likely to ultimately choose and graduate in majors that take longest to graduate on average, such as engineering.

**Table 4.3 – Association of Major Choice Behavior with Time to Degree (in months)**

<table>
<thead>
<tr>
<th>Elapse Time from Enrollment to Degree (months)</th>
<th>(1) Generalized Linear Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Formal Major Switches</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>2.25***</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
</tr>
<tr>
<td>Two or More</td>
<td>4.37***</td>
</tr>
<tr>
<td></td>
<td>(0.56)</td>
</tr>
<tr>
<td>Undecided at College Entrance</td>
<td>-0.24</td>
</tr>
<tr>
<td></td>
<td>(0.30)</td>
</tr>
<tr>
<td>Observations</td>
<td>4,020</td>
</tr>
</tbody>
</table>

Source: BPS 04/09  
Note: Base level for “number of formal major switches” is zero major switches. Base level for “undecided at college entrance” is entering college with any declared major. AME = average marginal effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05

**Satisfaction with Final Major Choice**

The final regression model presented in this section analyzes the relationship between major choice behaviors and the students’ satisfaction with their final major choice. The dependent variable was collected as a student indication whether they were satisfied with their final major choice or not. Since this data was collected as a dichotomous variable, a logistic regression is used for this analysis. This model only includes graduates as the survey item asks about satisfaction with major at graduation.

I find, as shown in Table 4.4, that entering college undecided has no significant association with student satisfaction with their final degree program. When compared with students that never changed their major, students that did switch their major were significantly less likely to be satisfied with their final degree program. The average student that switched their final major one time, all else equal, was 3.7 percentage points less likely to be satisfied with their major than a student that never switched. The average student that switched their major multiple times was even less likely to be satisfied with their final choice. The average multiple major switcher had a final major satisfaction rate that was 6.5 percentage points lower than rate of the average non-major switcher when controlling for multiple covariates.
Table 4.4 – Association of Major Choice Behavior with Satisfaction with Final Major

<table>
<thead>
<tr>
<th>Satisfied with Final Major Choice</th>
<th>Logistic Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Formal Major Switches</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>0.69***</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
</tr>
<tr>
<td>Two or More</td>
<td>0.55***</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
</tr>
<tr>
<td>Undecided at College Entrance</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
</tr>
</tbody>
</table>

AME for Number of Formal Major Switches (percentage points)

| One                              | -3.69***            |
|                                  | (1.36)              |
| Two or More                      | -6.50***            |
|                                  | (2.27)              |

Observations 4,190

Source: BPS 04/09
Note: Base level for “number of formal major switches” is zero major switches. Base level for “undecided at college entrance” is entering college with any declared major. AME = average marginal effects. Robust standard errors in parentheses. *** p<0.01, ** p<0.05

Limitations

This work has several limitations, with the primary one being potential presence of selection bias. There are certainly a number of unobservable, or at least difficult to quantify, variables, such as tastes and preferences, that go into college completion and major selection. While these models do control for a great deal of personal characteristics and external factors, one could imagine a scenario where unobservable variables, maybe a personal desire for an extended adolescence, correlate with propensity to switch majors and to take a longer time to graduate. The presence of this selection on unobservables and omitted variables could bias these results. In an ideal world, a researcher would like to find an instrumental variable that would be correlated with the treatment (major switching) but not the outcome (time to degree or probability of graduation), but this proves extremely difficult, if not impossible in practice. Thus, results in this chapter are presented as descriptive associations and I do not claim any causal findings. However, these descriptive findings are undergirded by the rich qualitative analyses in the next two chapters.

These data are also somewhat old, with the cohort of students starting in the 2003-04 school year. There is currently another round of the Beginning Postsecondary Survey being
administered and will be completed this year, but results will be shared too late for this analysis. This limitation is also addressed by the analysis of very recent student data in a later chapter, but that data is from a single university and is not nationally representative. The data included here are the most recent nationally representative data with needed variables available for study. These data also lack information about the timing of major switches (which could play a part in extending time to degree) and only list the frequency. Once again, the more detailed single university data analyzed in a later chapter allows for this additional layer of detail.

Discussion

Additional time enrolled in college is costly for students, both in direct costs and opportunity cost from lost time on the labor market. There is evidence to suggest that major switching is a determinant in the elapsed time to degree for bachelor’s degree seeking students and that it is associated with an additional half semester to a whole semester increase in the time to degree. As previously stated, there are very real costs associated with attendance for additional semesters, both in tuition and opportunity cost. There is evidence to suggest that helping students avoid major switching may be one potential avenue for universities to get students out the door with their degree in hand more quickly and meet their four-year and six-year graduation rate targets. However, there may be potential benefits to major switching that need to be included in any calculations to this effect.

The conventional wisdom is such that major switching is normally seen as something negative and we did find that it could lead to some additional proximal costs for students in terms of tuition and opportunity cost. However, it appears that there is some evidence that some major switches are “good”, at least in terms of helping the student get a diploma. Single major switchers are actually more likely to graduate than those students that never changed their major, while there was no difference in graduation rates for those that switched multiple times and those that never switched when controlling for a host of covariates. This is a significant benefit for single major switchers, even if it is costly in near term in terms of additional time to degree. If a major switch helps a student obtain a college degree where she or he otherwise wouldn’t, the “sheepskin effect” of holding a degree on lifetime earnings would almost certainly outweigh the additional proximal costs in tuition and opportunity costs of additional time in school needed to earn the degree.

Another important finding is that entering college undecided was not associated with any of the negative outcomes studied here. There was no statistically significant difference between the graduation rates or the times to degree of students that entered undecided and students that entered with any declared major, when you control for a wide set of covariates. Thus, it might behoove students to take some time to come to college, adjust to life in a new environment, and explore potential major choice prior to making a declaration.
There are also significant differences in average times to degree between different families of majors that students should be aware of. When compared to students with a major in the humanities, students with majors in education, health, and engineering fields took significantly longer to graduate on average when controlling for a host of covariates. This information is useful for students to know for financial planning purposes, as an engineering degree in particular is associated with adding the equivalent of an additional semester on to time to degree on average. This may be balanced by the high lifetime earnings associated with engineering careers, but the potential additional costs should be nevertheless taken into account.

The next two chapters will qualitatively explore how students make their major decisions, both initial declarations and major switches, and potentially begin to uncover the mechanisms behind these quantitative findings. If it is costly to switch majors (and it appears that it is in certain situations), universities need to find ways to help students make higher quality initial choices to avoid switching and knowing how and why students make the decisions that they do could only help this goal.
Overview

This section of the dissertation will describe the analysis and findings from semi-structured interviews conducted with university freshmen that had not yet made their initial major declaration. All of the 49 students were participants in the university’s deciding students program. The first round of interviews was conducted in person and took place during each student’s first semester on campus. Follow-up interviews were conducted with 47 of the 49 original participants by phone during the summer after their first year of enrollment.

Methodology

Deciding Students

Semi-structured interviews were conducted with deciding students. Deciding students are students that have not yet made their initial major choice and are receiving a suite of services from the university as part of a deciding students program. To track the decision-making process, two interviews were conducted with each interviewee in a longitudinal fashion. The first took place during the students’ first semester (Fall 2016) and the second took place in the summer after the end of the students’ first academic year (Summer 2017). The first round of interviews took place in person on campus and the follow-up interviews will be conducted by telephone. Originally, 70 students were randomly selected for interviews from the population of 367 freshman students participating in the deciding students program with a goal of having 40 students participate in both rounds of interviews. Participation in these interviews was incentivized by an electronic $20 Amazon.com gift card that was emailed to the students immediately after completion of the second interview. The first interview was designed to take 30 minutes at maximum and the follow-up interview was designed to take 20 minutes at maximum.

Students were contacted via email with an invitation to participate. The initial response rate to the inquiry was low, even after multiple follow up emails to the initial sample. Because the desired number of participants was not able to be reached with the original random sample, the full population of 367 freshmen in the deciding students program were invited to participate. These students were contacted via email along with a message from the university through their student online portal informing them of the project. Ultimately, 49 participants were recruited from this group. As students signed up for an available time for the in-person interviews, their mobile phone numbers were collected. Students were provided with a text message reminder 30 minutes prior to their appointments, which all took place over one week on campus in a meeting room supplied by the university.
The follow-up interviews were conducted via telephone over the summer after the completion of the participants’ first two semesters of college. Students were contacted via their university email addresses to remind them of the project (and the $20 incentive) and tell them to expect a text message over the coming weeks to set up a time to perform the follow-up interviews via telephone. Students were then contacted individually via text message using the mobile phone numbers shared by the students prior to the first round of interviews. The vast majority of the follow-up interviews were conducted during the month of June 2017. There were a few students that were slow to respond to initial inquiries and were followed up via text message, email, and voice mail, as well as an email from a university representative in some cases. The late responding students were interviewed in late July and early August 2017. Only two of the original 49 participants did not respond to requests to perform the follow up interview, leaving 47 participants that completed both rounds of interviews, a 96% retention rate between rounds. Students were emailed their electronic gift card immediately after completion of the 2nd interview.

The protocol for the first interviews explored the generation of the major choice set and the process of selecting a major from this choice set. Interview questions also addressed primary sources of information on different major choices, the majors under consideration by each student, and the factors by which students rank different majors during their deliberation. The actual protocol used can be found in Appendix A. The protocol for the second round of interviews varied based on whether the student has selected a major or not. Those that have not selected a major received a very similar interview to the first round. When answers differ from the first round of interviews, probes explored the reasons behind the changes in opinion. Students that had chosen a major prior to the second interview were asked about the factors that ultimately lead to that choice and how sure they are about their major choice. Some of the students in the sample did leave the university, whether it was by transfer to another institution or by dropping out. These students were still followed up with an eye towards determining whether major decisions (or indecision) played a role in the decision to enter the labor force or change institutions.

**Major Switchers**

Focus groups were conducted with students that had changed their majors in the semester prior. The sampling frame for this group was all full-time main campus students that had formally changed their major in the Fall 2016 semester. 250 students were randomly sampled from this sampling frame by the university’s institutional research office and provided to me with email addresses for the purposes of recruitment. These students were contacted via email with a request to participate. The focus groups were designed to take one and a half hours at a maximum. Participation was incentivized by an electronic $10 Amazon.com gift card. As intended, two focus groups were conducted, one with six participants and one with seven participants, on campus in a meeting room provided by the university in April 2017. Participants
received their incentives via email immediately after the complete of their respective focus groups.

The focus group protocol covered all three parts of the major decision framework as shown in Figure 2 in the previous chapter. It began with questions about the timing of the initial choice, the factors that determined the initial choice, and the reflection and evaluation period that led to the decision to switch majors. The protocol continued by asking about the generation of a new major choice set, the factors used to determine the new major choice, and how these factors differed from those used in the initial major choice. The actual protocol used for these interviews can be found in Appendix A.

Seniors

Focus groups were also conducted with seniors that would soon be graduating and entering the labor force. The sampling frame for this group was all full-time main campus students that were on senior status during the Fall 2016 semester and were still enrolled in Spring 2017. Since neither a progress towards degree measurement or a list of students that had applied for Spring 2017 graduation were available, this sampling frame was the best proxy for the desired group of seniors preparing for graduation. Ultimately, 250 students were randomly sampled from this sampling frame by the university’s institutional research office and provided to me with email addresses for the purposes of recruitment. These students were contacted via email with a request to participate. The focus groups were designed to take one and a half hours at a maximum. Participation was incentivized by an electronic $10 Amazon.com gift card. Nine total participants were recruited from this group, slightly lower than was desired. Although I planned to conduct two focus groups with six to eight participants, due to scheduling difficulties, three smaller focus groups were conducted, one with four participants and two groups with two participants each. One individual interview was also conducted with the same protocol as the focus groups. These were all conducted in April 2017 on campus in a meeting room provided by the university. Participants received their incentives via email immediately after the complete of their respective focus groups.

The protocol here was the same one that was used for major switchers, but probes asked students to reflect back on their major choice (or major choices, as they are likely to have had multiple majors prior to reaching this stage in their college careers), examining the factors behind their choices and whether there was any information that would have liked to have had when they were making their major choice.

Descriptive Statistics

As a part of the interview, a limited amount of demographic information was collected and is displayed in Table 5.1. Approximately 57 percent of participants were female and 43 percent were male, closely matching the gender breakdown of the campus at large. About 29 percent of the students were first generation college students (using a broad definition of neither parent
having received a four-year college degree), which is slightly higher than the university as a whole. 59 percent of participants attended high school in an urban area (as defined as being in a metropolitan statistical area), whereas 41 percent of interviewees hail from a rural area or a small town. This rural/town percentage is much higher than the percentage for the state as a whole, but this is not particularly surprising due to the rural location of the university from which the students were drawn.

Table 5.1 – Demographics of Deciding Students

<table>
<thead>
<tr>
<th>Demographic Category</th>
<th>Characteristic</th>
<th>Initial Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Initial Interview</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Follow-up Interview</td>
<td>47</td>
</tr>
<tr>
<td>Gender (%)</td>
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<td>42.9</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>57.1</td>
</tr>
<tr>
<td>First Generation Status (%)</td>
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</tr>
<tr>
<td></td>
<td>No</td>
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</tr>
<tr>
<td>Urbanicity (%)</td>
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<td>59.2</td>
</tr>
<tr>
<td></td>
<td>Rural/Town</td>
<td>40.8</td>
</tr>
</tbody>
</table>

The next section will describe which potential majors were under consideration and how the potential major choices of these 49 students changed over a one year period.

Top Major Fields of Study Under Consideration

Majors under consideration were collected from each interviewee, in rank order where the students had a distinct hierarchy of choices. For ease of discussion and presentation, the individual majors have been grouped by two-digit Classification of Instructional Programs (CIP) codes. In the first interview, students were asked to provide up to five majors currently under consideration. Just four students provided the maximum number of options of five, while respondents each shared, on average, 2.7 different majors under consideration. This shows that, at the time of interview (part way through the initial semester), most students had created a reduced choice set of potential majors that they were closely considering.
As shown in Figure 5.1, the most popular major choice under consideration at the time of the first interview was business: 26 of the 49 students interviewed were considering some sort of business major. While business is a very popular major on campus, some of this popularity in this population can be accounted for by the fact that the business school has competitive admissions. Students who have not been accepted as pre-business majors that want to continue to pursue admission to the business school often choose become a part of the deciding students program as they attempt to improve their academic profile. Health majors and fitness and leisure studies were the next most popular majors with 13 of 49 students considering majors in those fields. The health major group contains pre-med, nursing, health care administration, and applied health studies. The leisure & fitness studies group was a group that was expected to be amongst the most popular based on previous work, but it includes sports management and travel, leisure, and event planning, two majors that are very popular on this campus. It also includes exercise science, which includes a rigorous curriculum that many students take as a precursor to graduate school in physical therapy. Education was also a popular major under consideration, with over 20% of interviewed students considering becoming a K-12 teacher. Psychology, sociology, and social work were also popular choices under consideration.
As described earlier, the follow-up interviews took place by phone with 47 students that began their college career undecided on their major field of study. Most of the follow-up interviews took place in July 2017, giving the students one and a half semesters, plus a few months of summer, to consider their major and potentially make a declaration since the first round of interviews took place. One student had stopped out of secondary education totally and was considering re-entering college in the Spring 2018. This student was treated as being undecided for this analysis. Four students had transferred to another four-year university and were enrolled to attend in the fall 2017. Their major choices or declaration were recorded as for other students. The remaining 42 students persisted at the original university and were enrolled to return in fall 2017.

As shown in Figure 5.2, about half of the students had formally declared their major at the time of the 2nd interview. Another 15 percent of students had formally declared a college, but had not decided on a specific major. A large majority of these students declared as undecided in the college of business – they know they want to pursue a business major, but do not know whether they want to specialize in accounting, management, marketing, etc. This may appear like a trivial change, but declaring a college will see a student be assigned a college-specific advisor. A college-specific advisor should be able to provide more specific advice about the college and each specialization compared to a generalist advisor in the deciding students program which has to be knowledgeable about all majors at the university.

Another 15 percent of students had decided on a major, but had not yet formally made a major declaration at the university. There are barriers to declaration when remote from campus (paperwork and mandatory advisor meetings), so most of these students made their decision over the summer and are waiting to return to campus in the fall to make a declaration. The remaining 23 percent of students were still undecided at the time of the second interview.

These data show that the students that began their college careers undecided had become much more sure about what they wanted to study over the course of their first year on campus. The average student was considering 1.26 different majors at the time of the second interview, reduced from 2.7 majors under consideration at the first interview. About three quarters of students had made a declaration of some sort or had decided and intended to declare at the next opportunity. Even among the group of students that had not yet chosen a major, significant progress had been made. Only two of the remaining undecided students were considering three different major choices at the time of the second interview. The remaining undecided students had narrowed their choice set down to two potential options.

The array of majors under consideration or declared by students at the time of the second interview, as shown in Figure 5.1, had some material differences from the majors under consideration at the time of the first interview. The pool of majors became much smaller as students made or narrowed their choices. English, aviation, environmental science, physics, and
criminal justice were no longer under consideration by any of the 47 students. Education, health (largely due to the elimination of nursing as an option by many), social science (sociology), psychology, and visual and performing arts all had a large reduction in the number of students considering those fields as majors. Only two majors had an increase in the number of people considering them – computer science and architecture – at the time of the second interview. Business remained the most popular choice by far, with 20 of the 47 respondents considering or declaring this major. Leisure and fitness studies (sports management and exercise science), social work, and computer science were the next most popular choices, in that order.

Of the 22 students that formally declared a specific major, five of them declared business with a specific concentration (accounting, marketing, etc.). Three students declared an education major. Two students each declared sports management, architecture, and social work. Four of the 22 declared what would be considered a STEM major.

**Figure 5.2 – Deciding Student Decision Status at 2nd Interview**

![Pie chart showing decision status]

*Source: primary data collection via interview*

**Description of Major Switches**

It is hypothesized that the timing of a major switch (meaning when in a student’s academic career they make the switch) or the major combinations that they switch between may have an impact on any additional time to degree or excess credits that may need to be taken in order to graduate. A quantitative description of major switching proclivities for a larger population will be given in a later chapter of this dissertation, but this section will describe the nature of the major switches made by major switching focus group participants.

The range of major changes that the study participants made is large. On the low potential impact end, a student switched from an apparel merchandising major with a marketing minor to a
marketing major and an apparel merchandising minor. This type of change will likely have very little impact on the student’s progress towards a degree other than slightly reducing the amount of apparel classes and slightly increasing the amount of marketing courses taken. On the potential high impact end, another student switched from a major in dance to a major in business management. This kind of radical change, unless it is made very early in a student’s career, could be a costly one in that the student would have to begin a math course sequence that is not required in the original major and the second major does not have very much room to absorb elective credits.

Most reported major changes fell somewhere in the middle of this range. There were several switches between related majors within the same college – such as applied health science to health care administration or accounting to business management. In these cases, students would retain the same academic advisor in most cases and would still need to take a similar group of preparatory courses. However, it was also very common to have made a switch from a major in one college to a major in a different college, which requires a switch of academic advisor. Programs in different colleges also often have degree requirements that are less coordinated and can have varying requirements like co-ops or internships that can be difficult to catch up on in a timely manner.

The program to program path of a major switch is important, but the timing of the switch is also important. Students that switch later in their careers have less time to complete the new degree requirements without extending their time to degree. This wasn’t an issue for one major switcher, who only lasted one day on campus before switching away from journalism, which he declared before getting to campus, to sociology. Most of the students switched during their sophomore year, which left a good amount of time for them to complete their new degree requirements with little to no extension of time to degree, with a few exceptions for switches into majors with long required course sequences. The latest switch reported by a study participant was a switch after the student’s tenth semester on campus. A more detailed discussion of this student’s experience can be found in the “serial major switching” section later in this chapter.

Reasons for Being Undecided

A primary aim of this dissertation is to discern why and how students have trouble making decisions about their major. Since the population of deciding students being interviewed were actively attempting to make their first major declaration, they were in an excellent position to discuss the trials and tribulations of major choices. Students were given the opportunity to answer the open-ended question “Why haven’t you chosen a major yet?” and each student had their own personal reason or story to why they hadn’t yet chosen to declare a major. While there was a good deal of variation in the particulars of the responses, the responses can be grouped in to some common broad themes.
Fear of Commitment

The most common reason stated entering college undecided was a fear of commitment to a major that they were not complete sure about. Many of the deciding students entered with a clear top choice of major, but were afraid of committing “because that is what I am going to be doing the rest of my life!” One student said,

I was very unsure. I'd wanted to be a vet my whole life, but I know it's very competitive and really difficult. But when I got here, I just ... this is something I really want to do, and I kind of wanted to look into what else I could do within that science-y field. So, I just didn't want to rush my decision. So, I just came in undecided and told myself I'd figure it out later.

Incidentally, the student above declared the major that they had wanted to be their entire life shortly after the first interview. These feelings of knowing what you want to do, but being afraid of declaring it are borne out by the fact that many of these students declared their major during the following semester after having more time to reflect or explore their primary major choice via class taking or other means.

There also seems to be awareness of the potential problems associated with major switches. One student shared that they hadn’t yet declared a major “...because I'm nervous, and I'm afraid to change my major. I want to make sure that I pick the right one. I don't want to psych myself out. I should just tell myself to calm down, and that it's okay and then I'll pick one.” There were enough students that specifically stated that they didn’t want to change their major or they only wanted to make one major declaration to think that there was some sort of stigma associated with major switching, beyond potential effects on time to degree. There was also a sentiment present that going in undecided gives additional time for exploration and information gathering that would improve the quality of the ultimate choice.

Unsure of Future Interests

Another very common reason for entering college without deciding a major was that students are unsure about their interests, both now and potentially in the future. Many students have not developed their interests enough in any particular area to feel comfortable specializing, like this student.

I don't really want to jump into anything too quick, I'd say, probably. I don't really have one specific thing that I know I want to do for the rest of my life, like I can't just say, ‘Oh, I want to go into finance.’ There's nothing that's clear cut for me right now. It's kind of just feeling different things out and just seeing what piques my interest the most.

Other students focused on the idea that the major they are choosing now needs to be a topic that they could possibly be interested in 30 years. This kind of linear thinking (major = lifelong career in this exact subject) was very common amongst the respondents. One can see how this misguided and impossible need to be clairvoyant about your future could lead a student to feel a
great deal of strain. This feeling veers quite closely to a fear of commitment, but there are subtle differences. Those coded as having a fear of commitment had a good idea what they interested in, but could not pull the trigger to declare a major. These students that are unsure of the future interests were those that hadn’t quite discovered what they were interested in or predicted where their interests might lie in the future.

**Multipotentiality**

Several students reported that they were having trouble deciding on a major because they see themselves succeeding in many areas, as exemplified in the following quote. “I'm very different in the sense that like I enjoy everything, and so it's really hard just to choose one thing you love when you love everything.” The term “multipotential” has been used to in this context to describe this kind of student. A multipotential student is one that “when provided with appropriate environments, can select and develop a number of competencies to a high level” (Fredrickson and Rothney, 1972) and that moniker seems to apply to a number of the interviewed students.

With the possibility of success in many different areas, it is no wonder that students have problems making the decision to declare a major in one subject. As this quote exemplifies, this is the first time in many of these students’ lives that they are being asked to narrow their future path options.

In high school, I was a very well rounded person. I wasn't fantastic at just one thing. I played soccer, I did dance, I did the musicals, I was kind of all across the board. So, I really think that I am just an indecisive person. I like so many things that challenge me, to just set one … I am specializing in one thing for the first time in my life.

This can be a difficult adjustment. However, incoming students also don’t often know about or consider options that can help mitigate some of these concerns. One is the option to minor, double major, or even triple major in other subjects, which was not frequently discussed by these students. Another is that certain majors allow for more electives than others, which could allow explorations of various interests beyond the chosen major or facilitate a minor or double major. This level of detailed knowledge of differences between degree programs is not something that the vast majority of students hold and would need to be advised by an official advisor or peers. There are ways for students to explore multiple interests, but it takes a level of institutional knowledge to know this that these students do not have.

**Accustomed to Being Told What to Do**

While not a particularly common reason given for entering school without deciding a major, a handful of students found the major decision making process quite difficult as they are used to the parents making decisions for them. A student shared that “I wish that (someone would tell me what to do) all of the time, because I am used to being told exactly what to do, and doing it.
And I am fine with that.” Another student shared a very similar sentiment and said that she wanted someone to tell her what to do “because she doesn’t want to make the wrong choice.” This, of course, assumes that other party (usually parents) would make the right choice in her stead. It at a minimum abdicates responsibility for the wrong choice to another party.

**Lack of Information**

Some students reported that they did not yet have enough information about their respective areas of interest to make a major declaration. There was a sentiment present that going in undecided gives additional time for exploration and information gathering, as exemplified by this student:

> I don't feel that I've gotten enough exposure to everything. I have lots of options, as an incoming freshman … and I believe that to pick a major right away and stick to it is kind of pointless, when there's so many options for me to explore and discover. I'm keeping my mind open but, obviously, I have a path that I'd like to follow, as far as something medical-related.

It certainly seems possible to explore other major choices even if a major had been declared prior to arriving on campus, but students reported that coming in without declaring a major helped them keep an open mind about different choices since they weren’t already anchored on their original choice. Interviewed students were also required to take a career and life planning course (which will be described in more detail later in this chapter), which is a reliable source of information about various majors. Decided students are not barred from taking this class, but it was reported in the upcoming academic advisor interviews that they rarely do.

**Initiation of Major Consideration**

During the initial interview, deciding students were asked about when they began thinking about what to study in college. Responses were coded into four categories, as shown in Figure 5.3. It is impossible to choose a major if you have not thought it and it takes most students some time to decide once the consideration process begins. Thus, it is important to begin the major consideration process in a timely manner. This information could also be used to inform any interventions reaching back to high school to provide information about different majors. It may not be worth it to provide information to students during their freshman year of high school, when a large majority have not even begun to think about it. Conversely, the results could be viewed as a good argument for early interventions to induce high school students to start thinking about the process.

The most surprising finding from the responses to this question is that about one third of the respondents reported that they hadn’t started thinking about what they wanted to major in until after they had graduated high school. For this to be true, these students had to have decided to attend college full-time and have chosen a particular university prior even commencing their major decision making process. Some of the students had concentrated on where to go to school
and then began thinking about the major in the summer between senior year of high school and freshman year of college, like this student: “I hadn’t really thought about it. I thought about it over the summer (prior to college). I worked in a high school doing janitorial work and had a lot of time to think about it.”

Another sizable group of students reported not beginning to consider their major until after arriving on campus and often started thinking about their major after an event like a class assignment or orientation. Students have to schedule classes for the fall semester during orientation with an advisor, where there is supposed to be a conversation with advisors about majors under consideration. This is designed to allow the advisor to suggest classes that will allow the student to explore areas of interest. Thus, all of the students that reported initiating their major consideration process during their first semester on campus had a specific conversation about potential majors with an advisor. It was apparently not sufficient to spur further thought on the subject.

On the other end of the spectrum, a few students’ major decision making processes began prior to high school and, in some cases, as a young child. In this deciding population, this came in the form of a student having a subject or career that they were dead-set on when they were younger, but then became unsure about it for some reason. Some were concerned about the requirement of graduate school for careers in the chosen area and others became unsure due to career considerations associated with their “childhood dream” majors.
Important Factors in Major Choice

Another primary aim of this dissertation is to understand how students make their major choices and find out what factors students use to weigh potential major choices against each other. Knowing this information and the relative importance of each factor will allow advisors and other stakeholders to provide information on the factors that students value the most. The deciding students were asked to report the factors that they were actively using to weigh major choice options against each other in an open-ended question. After sharing the options that were relevant to them, probes were asked about factors known from the literature to be important for some students (like pay and career considerations) if the student did not discuss them in their response to the open-ended question. The range and commonality of responses from the deciding student interview will be discussed in this section.

Personal Values and Interests

The most common responses from deciding students during the first interview was that potential major choice need to fit their personal value systems and interests. One student shared that “it (my major choice) needs to line up with my morals, with my values. I need it to go along with that. It wouldn't work with something that I don't necessarily believe is correct or whatever.” A discussion of major choices supporting personal values was highlighted by nearly every student considering a “helping” major, such as social work, health related fields, or education. A number of deciding students stated that they enjoy helping people or want to find a way to help people, sometimes driven by personal stories of difficulties that motivate them to help others avoid similar situations. A deciding student shared,

I definitely think that people should look at what they really love to do, just because I've watched my mom be unhappy with her job, and she comes home and complains about it. She doesn't really love what she does, and she feels like there was (sic) other opportunities she could have taken.

Many students used the word “passion”, as exemplified by this quote: “I think overall passion. We talked a lot about in a class how you choose your passion, and I think a lot of people are looking for things that they love. I think if you pick something that you are interested in and you stick to it, you will be successful.” This is a good example of student talking about finding a passion as it would potentially sustain them throughout their career and this student was not the only one to equate passion to an increased probability of career success in the future. In fact, most of the “passion” discussions centered on finding a career that a student would be passionate about, with very little concern to more proximal issues, like coursework.

Discussion of values and interests was often the first thing out a student’s mouth during their first interview after the question regarding factors for weighing different major choices against each other was asked, but it was often quickly followed by some of the more practical concerns discussed below.
Ultimately, in the 2nd interview, some students chose a major that would lead to a job that they would be most interested in. This outweighed academic concerns and thoughts about pay levels. The basic question was, “will I be happy with the job that this major will lead me too?” This student said that there is no more important factor than this:

And she said like, "Yeah, there's are people out there that wish they made more money, but at the same time, they're still very happy about what they're doing what they're doing. That's the most rewarding thing about life, you're just enjoying your job. Yeah, maybe you don't have as much money as another person, but it's all about being happy with what you're doing.

No one can be in a job that they hate. You're going to sit here and try to look for new jobs. I kind of related to that because my mom was like... Okay, she likes her job now, but like beforehand she like transferred, she had a different job like each year. I could go into forensic science and probably make more money, but at the same time, psychology is what makes me happy, helping people makes me happy. To me, that's more rewarding than making a little bit more money.

There was also a great deal of evidence about student’s interests evolving over time and thusly affecting how they feel about particular majors. Here is a student talking about why he dropped some particular majors from his choice set:

I just didn't know if I was that passionate about it. Sports Management, you know, I love sports, I'm a sports guy. And maybe if I do go into Business, I can still, you know, see that aspect of it, but it's not really ... I took an intro class, I took a sports philosophy class on it, and I don't know, I think I just like watching sports. I don't know if I really like being so in depth with it ... I just like enjoying it. And then Psychology, I don't know, it just doesn't seem as attractive. I don't think I'm in the same mind set as I was then. I don't know, I think I've always just been interested in social interaction and how the brain works and stuff. I don't think that I could really make a career out of that, so I think that's why I have been led to Business.

Interests can change over time and that can be the reason that majors are dropped from the list by some students. In this case, the depth of the student’s interest was revealed to him through coursework and other life experience. It wasn’t that his interests changed per se. It was that he discovered in which domain he wanted to exercise those interests.

Day-to-Day Career Activities/Working Conditions

The next most common factor that students were using to differentiate between majors was working conditions and the day-to-day activities for the careers that they associated with the major choices that they were considering. The fact that these concerns were so prominently mentioned is another good example of the prevalence of linear thinking tying majors to particular lifelong careers and even positions among deciding students. The range of issues under consideration was almost completely covered by this comprehensive response from a deciding student in their first interview:
You probably want to think about … what kind of conditions you want to work in. Like, do you want to work outside? Do you want to work in an office? Do you want to be doing different things? And, you also have to think about what that job requires. Like, if you were in the medical field, you'd have to work possibly holidays and stuff like that. For an office job, sometimes it's just like the week and then you have the weekend for yourself. I could never work in the front-line health industry. I can't watch any TV show where to do surgery or anything like that. I can’t do it.

Schedule, setting, and work variety of careers commonly associated with various major choices were very common points of discussion among the deciding students. One student even wanted to avoid having to type or use a computer. “I knew I couldn't be like a guy in the office with a suit on. I didn't get a laptop until I came to college. I didn't even want a laptop. I hate typing, everything.” As evidenced by the two quotes prior, this factor was often used to eliminate potential major choices from a student’s choice set. If you cannot stand needles or the sight of blood, this is an easy way to eliminate nursing from a list, even if your values lead you to consider “helping” majors. If you like to talk to people, then perhaps a more solitary pursuit like mathematics or computer science is not a good fit.

This factor became the final differentiator for a couple of students in the 2nd interview that were trying to decide between construction management and business management. Both students thought that business management might be best because they would have broader options for a career. However, when it came down to it, both students chose to declare construction management because they didn’t really see themselves spending all day in an office. They did realize that they would probably spend some of their time in an office, but they really valued the opportunity to get outside and manage the project on site.

Job Availability/Location

Another important career related factor to many deciding students was the potential availability of jobs in careers traditionally associated with different majors and the matchup of job availability and desired living location. For some students, desired living location is a very strong factor that can overwhelm even a very strong interest in the subject matter, like this deciding student:

They actually have a good program for marine biology here. I have always really, really loved manatees. I did a lot of projects on them when I was younger, and my dad had scuba certification for a long time. The summer of my freshman year of high school, he got me and my brother certified, and we went on a couple of vacations. Got to see really, really cool stuff scuba diving. Totally awesome. This would be so cool to do as a career, but I don't know if I want to move to where it would be interesting as a career, if that makes sense. I am still considering it because I'm not 100% sure what I want to do. I've always been very pro ‘save the whales’ and I hate Sea World. I've done school projects on that, too. I'm actually giving a talk on it tomorrow for one of my critical thinking classes. I've always been really fascinated with the ocean. It would be a very enjoyable, happy career.
This student has been interested in a field since childhood and it is a good match with the student’s personal values. The student has explored the subject in great depth and has decided that it would lead to an enjoyable and fulfilling career. However, all of these positives were overwhelmed by the likely requirements to move to a coastal area and the student’s desire to remain near family.

Deciding students’ opinions were mostly divided on desired post-degree living location – They wanted to stay around their respective hometowns or they wanted to move out of state to a city. After an interview concluded, it was not uncommon for one of these students to turn the table on me and ask questions about life in California. Students were often able to make attributes of careers associated with their considered majors fit their desired narrative, like these two students interpreting the same attribute in different ways: “I like the fact that, wherever I go to live, there will be hospitals nearby” and “I like the idea of working in a hospital especially because it will be more likely to find a job anywhere, and I won't have to necessarily move from my career.”

Some deciding students were agnostic about their geographic location and were mainly concerned with the general labor market for careers associated with their potential major choices. How hard is it going to be to find a job when the graduate in four or more years? Many of the students considering becoming licensed to teach in a K-12 setting often cited the labor market demand for a certain type of teacher as a factor in their consideration of which area of education to pursue.

Speaking to the deciding students after they had declared a major in the 2nd interview, it seems that job availability was often used as sort of a tiebreaker between two majors that were evenly matched in a student’s mind. Sometimes, the ties were two specialties in the same area, like this student, who said, “I like history but there's not much of a demand for high school history teachers right now, so. Yeah, English was just kind of the way to go.”. Another student used job availability to break the tie between business and construction management, saying “I just chose business in general because it's so broad. I have some flexibility in job availability. You can major in business and business jobs can have to do with a lot of areas. It can be in construction or it could be anything really.”

Pay

The perceived salary level for careers associated with different potential major choices was a very common point of discussion for deciding students. However, opinions about how to factor pay into major decision making had a very large range. Pay level was often talked about as a line that needed to be crossed. If a major didn’t provide a perceived level of pay that was sufficient, the major was eliminated from consideration. One said, “Pay is very important to me. There are a couple of things that I haven’t pursued due to the pay … I thought about them for a while and thought ‘No, I can’t make any money in that.’” This student voiced a similar opinion on the importance of pay that was commonly heard: “It (pay) is important to me. I want to be at
least be able to provide for my family, but it's not like my major drive.” Students frequently talked about making enough pay to be “comfortable”, which certainly would take a different definition from student to student. There was talk from some deciding students that they didn’t want to appear to highly value pay as it was somewhat unfashionable, saying things such as “I know talking about pay is cliché…”

Other deciding students were very clear that garnering a high paying job was the primary factor in their major decision making. “Pay is a factor because I live a pretty wealthy lifestyle. I’ve got a lot of very nice stuff.” Some deciding students had very specific financial goals, such as this student: “I got (sic) goals when I'm adult. I want to like have a boat to fish off of or something ... I want to have a high enough salary for that.”

Deciding students also frequently talked about the potential tradeoffs between pay and desired work activities and working conditions. Most students that discussed this relationship said that they were willing to give up a little pay to get better working conditions or career match-up with their personal interests, exemplified by this quote: “It's (money) a big factor in things, but if you're making a lot of money, but you hate you job, that's just no fun. I'd rather get a somewhat well paid job to do what I love, rather than make a lot of money and hate going to work every single day.” However, there were a few deciding students that stated that they could “suffer through the work week” to have more money to pursue their leisure interests on the weekends or their desire to travel.

Whether or not the deciding students are using accurate information about the pay levels associated with different major to make their decision is another story and will be discussed in detail in a later section of this chapter.

The follow up interviews with the deciding students after the entire first year often revealed a more nuanced take on what factors were important them in a major, partly because they have been able to gather more information through first-hand experiences, like this student:

Yeah, I went out into a field placement with an urban school that was third and fourth graders. And then I kind of got a taste. And I didn't mind it, but I did see an aspect of schools that I've never seen before, you know, I've always been in kind of a rural community. I'm not real familiar with that. It wasn't that bad, it really wasn't. I kind of connected with some of the kids, it was enjoyable. But I did see that it's a whole new ball game, and that there is a chance that if I worked as a teacher I could be thrown in there. And I don't know how well I would respond to that. And also, I think the education field is just too much work and not enough result. You don't get enough for what you do. And I respect my dad for teaching. My mom used to be a professor. I just think that today's day in age there are better options for me to make money. I mean, that's an aspect of a career.

For those students that had declared their major at the time of the 2nd interview, pay was cited as the primary factor by a few students and they were consistent – they had also identified pay as being important to them during the first round of interviews. A few others had mentioned eliminating choices because the pay was too low or at least too low to pursue a subject that
required graduate school to work in the field. For most of the students, once the pay for the careers associated with the majors reached a certain minimum threshold, others factors became more important.

**Interest in Coursework**

During the first interview, it was relatively uncommon for deciding students to say that their interest in the coursework associated with particular major choices was much of a factor in their decision-making process. Among the few that did discuss their love for the subject matter being a factor in their major decision making, it was common for other influencers to implore the student to explore the careers associated with the majors beyond their general interest in the subject. One student said:

> I talked to the professor there [a major exploration event]. I love history. That's my favorite subject and everyone always thinks I'm crazy. I was always hearing, "Oh, you don't want to major or minor in history because you're just never going to get a job, that you're never going to use it." That's what everyone always told me. I was like, “No, I can use it,” but they always told me it would be useless.

Despite the paucity of mentions of interest in coursework as a major decision making factor during the first interview, it was very common for students to take courses in their areas of interest, although this was often based on recommendations from their advisors.

Nevertheless, this factor certainly became more prominent for the deciding students during their follow-up interviews. Having spent more time in the classroom after the 1st interview and realizing that they were going to spending a lot of time taking courses in major areas, many deciding students seemed to have increased their weighting on this factor over time. This student describes what he likes about his coursework in his major after saying that it was the major factor in his choosing this field:

> It [coursework in computer science] is extremely rewarding. But one of the bad things is that something extremely small ... like minute that you'd never think would cause so many problems can completely cause the program to not run. It's a good example, definitely. And it can sometimes be one of the most frustrating things ever. At the same time when you finally figure it out, it's the most rewarding thing ever I think I've ever taken part of it.

This student had declared as undecided in the college of business and was describing how she was planning on deciding on a specialty within the business school:

> But, it's just going to depend on if I like accounting. And if I like accounting, then obviously, that will go up there too, but ... for now, marketing is kind of just like ... like supply chain is definitely my number one. And marketing is just kind of like, something that I might be interested in, but I feel like supply chain is where I'm going to be. But my plan of action is just to take the classes and see if I like them or not and that is how I will decide.

It is interesting how the coursework was much more prominent in discussions with the deciding students during the 2nd interview. The importance of course interest was hardly
mentioned during the first interviews. Often times, it appears to have been the act of taking a
class that they didn’t like in a potential major area to spark the realization that interest in the
coursework was important. Once a student selects a major, coursework in that area is probably
the activity that they spend the most time doing until the graduate. Because of this, it was
surprising to me that it was rarely mentioned in the first interview, but it makes sense that it has
risen in prominence in the minds of students.

**Ability to do Coursework**

A very commonly discussed barrier to pursuing major areas of interest during the first
interview with the deciding students was perceived academic ability in required coursework for
the major. Some deciding students would have considered some majors more seriously, but the
students admitted that, as one said, “I am not smart enough for that major.” Computer science
and biology/pre-med were two specific majors that deciding students were interested in, but were
perceived to be too difficult to receive serious consideration. The most common barrier, by far,
mentioned by deciding students was math requirements and their perceived mathematical
abilities, as evidenced by this statement:

I think the biggest thing is that I suck at math. I hate math. When I met with my
advisor, she's showing me the math sheet. She was like, "This is what you need
to go to if you're in business. This is what you need to go to if you want to be in
environmental science." I was like, "Maybe I'll just minor in environmental
science [which doesn’t have the same math requirements]."

Some students were confident in their abilities to complete the coursework for the math
requirements, but were turned off by the length of course sequence required. Many majors,
including business, construction management, and most sciences, require students to complete a
calculus course. If a student was placed into the lowest remedial math via the pre-enrollment
math placement test, he or she would be required to take four courses prior to being able to enroll
in a calculus course. At this university, the two “lowest” mathematics courses in the sequence
can be taken in a proficiency-based manner that could allow a motivated student to complete
both of them in a single semester. Even accomplishing this, fulfilling a calculus requirement
would take these students four semesters, assuming no class drops and passing grades.

A student’s ability to do required coursework was not always discussed as a barrier. There
were a handful of deciding students that discussed during their first interview that they were
considering majors because they were good at the subject and would allow them to maintain a
good grade point average with less difficulty.

For the 2nd interview, most of the deciding students had taken at least one course pertaining
to a one or more of their major options under consideration since they had completed two full
semesters at that point. Great academic performance in these courses was not often a reason
stated for declaring a major. However, it was very common for a student to drop a potential
major from their choice set if they performed poorly in a course in that area. Some students that
had declared a major prior to the 2nd interview were asked what they thought might make them change their minds and spur them to change their major to something else. One of the most common answers to that question were that they would start to think about changing their major if their “grades start to slip.” This makes sense as there are often real consequences for students when their GPA starts to dip. They, of course, may need a strong GPA for graduate school or for employers concerned about that sort of thing. Often times, scholarships also come with minimum GPA requirements and students may be “forced” into a change of major if they want to be able to maintain the standard required to keep their funding.

Time to Degree

For one senior student, the primary factor used to select a major was potential time to degree. This student was in a unique situation in that, as a non-traditional student who had only taking a full-time course load during the last two semesters before graduation, she had an existing position where the job requirements had been increased from a required associate’s degree to a required bachelor’s degree. The student had a somewhat limited time to obtain a bachelor’s degree or be forced to give up her position. The student was also motivated by the fact that she would receive a pay raise as soon as she obtained a bachelor’s degree. So, the student could very clearly calculate the opportunity costs of extended time to degree and this became her primary factor for her major selection – Which major can I apply the most credits from my associate’s degree program (from many years in the past) and also has the shortest course sequences for the remaining required courses? The student was only interested in the “sheepskin” effect, although she did admit that fit of the coursework to her current work environment was the tiebreaker for the handful of options that were “tied” in terms of potential time to degree.

Time to degree concerns certainly become a factor for major switchers as well, as it was for this major switcher’s roommate:

No one really wants to extend into that fifth year or have to take all these extra summer classes or online classes, which are just even more expensive than taking regular classes. Yeah, I think that hasn't stopped everyone. I mean plenty of people still then try to change and will go that fifth or sixth year, but I think a majority of the people that I know and I've talked to, especially from my roommate’s experience for herself. She was anxious. She was like by sophomore year when she still had no major. She was like I need to come up with something. Because, I can't go more than four years. So, that [time to degree concern] becomes bigger. So, I definitely think within that junior year, it's kind of, especially if you've changed major two or three times already, you've just got to pick.

When switchers were choosing a new major, students definitely took into consideration the length of the remaining required course sequences and the potential for additional semesters or the necessity to take summer courses. As this student said, sometimes it is best to pick one and stick to a major if the returns to switching do not outweigh the additional tuition and opportunity costs of extending time to degree.
Difference in Factors Used for Initial and Subsequent Choices

After speaking with seniors and older students that had changed their major, it was clear that students changed over time their personal weighting of the factors that they use to select a major. There was already evidence of this from the ways that the deciding students changed the ways that they viewed certain majors over their first year on campus, and it was only more pronounced among the older students. As one might surmise, some major switchers became more concerned with career outcomes as they progressed in their studies and were closer to entering the labor force, as this senior student did: “It [initial major selection] was kind of like a blind shoot. I just kind of looked at the list and, I loved writing papers, I thought about a creative writing major. But then later, I also looked at what are the actual possibilities of getting a job as a creative writing major or English major.” This is the type of change that could have potentially been avoidable, as the original decision was made with little or imperfect information. If the student had been advised to think about the major choice from a career perspective from the start with good information, the student may have been able to avoid the extra semester that was caused by changing majors.

However, this was not always the case. With the amount of self-learning that goes on during college, students learn a great deal about where their true interests lie and also what they value in life. This major switching student originally had shied away from majoring in education due to concerns with low pay:

It [money] was definitely something I took more seriously in high school when they first thought about it … It's the reason I came in undecided. But then, I kind of came to my own conclusion. You know, I want to do what's best for me. I want to do what I love. I'm not concerned with money. I don't care- I'd rather do something that I love. I mean, I live a pretty frugal life anyways. I don't need the luxuries or you know, to live a frivolous lifestyle I'm not about that life and, like, one of my biggest strengths is that, like, I have, like this belief strength, which means anything I do in life has to have value or meaning to it.

Nevertheless, another kind of self-discovery is probably the primary reason for a major switch – academic performance. When students discover that they struggle in major-specific coursework, they will often begin to reassess their choice and will often change away from the difficult major to something that they believe will easier for them to perform academically.

Overview of Factors

While each student had their own personal way of weighing their potential major decision against each, there were certainly a lot of commonalities in the factors cited by deciding students during their first interview. This population of students at the time of the first interview (during first semester on campus) was very focused on career outcomes. Students displayed mostly linear thinking, tying potential major choices to specific life-long careers in that area. Concerns with coursework in the considered majors were relatively of less interest compared to perceived career outcomes. Personal values were an important factor to deciding students at the time of the
first interview, as well. “Soft” hard to measure factors were of great prominence to these
students, adding credence to the idea that it is difficult to use quantitative models to predict these
decisions because of the large role of tastes and preferences in the decision-making process.
These same factors were often factors in a major switch as well. Students learn more about their
tastes and preferences while in college and the preferences for different academic majors change
as well. As students advance in their college careers, academic performance becomes a large
factor in the continuation of a current major and in the selection of the subsequent major when a
student switches.

Sources of Information

There is a wealth of information available for major decision making students, but what
sources of information do students actually use? This section will discuss the sources and types
of information that students are accessing and using to help them make a decision on what
subject to major in. This discussion will include “non-human” sources of information. For an
analysis of other humans’ effect on the major consideration process, please see the external
influencers section later in this chapter.

Internet Searches or “Googling”

The most common source of information for deciding students was definitively general
internet searches (or “Googling” in the vernacular of most students) for information on subjects
of interest. Deciding students largely began searching for career fields that they were interested
in, rather than academic subject that they wanted to major in. This was a very common tactic
during the major decision making process of many students – find a career of interest and work
backwards to find a set of potential majors that could lead to the desired career outcomes. The
internet was often used as a supplement to information gathered from other sources. If they
couldn’t find information from personal sources, they often turned to electronic ones like this
student: “When I looked up the other majors, I used the internet as my basis. But for business, I
would say that I used my father.”

Students consulted a wide variety of websites and sources of information This deciding
student was one of many that preferred to consume information about areas of interest in video
form:

I watch a lot of YouTube videos. They have lots of that have YouTube channels
that talk about days in the lives and they talk about when they were in school,
and then also just looking on the internet. Just googling certain things, like how
much they make … My mom makes fun of me for watching the YouTube videos.
It's really helpful actually. I've learned a lot of things about being majors that I
never knew and you feel like you're actually seeing the stuff happening and they
talk about all of that stuff [pay, required schooling, and career information].
This quote touches on a potential generation gap between those that are trying to reach a major decision-making student with information and the student themselves. While older or less-tech savvy people may scoff at the idea of trying to pick your major using YouTube videos, it is important to recognize that this channel and more importantly, the video delivery method could be very important and effective ways to reach major decision making students now and in the future.

There wasn’t any particular channel or series of online videos that were particularly popular with the deciding students. Nevertheless, there are videos on college major choice that have hundreds of thousands of views. Students reported that they would watch a number of videos in a row, easily facilitated by the related video recommendations that accompany every watched video on YouTube. While the quality of some of the information is questionable, there is no lack of quantity available.

While many students did have a predilection for more informal sources of information on the internet, a handful of students at both the first and second interview reported visiting websites that are definitive sources of information for the subject matter. In particular, a few students reported spending a great deal of time of the website of the Bureau of Labor Statistics and the Ohio Labor Market Information website to gather up-to-date. One student relied on the BLS site heavily: “For example, every career or major I’ve looked into I’d see, before I even consider it, whether or not it’s growing or declining, how fast you can get promoted and how long you have to work, job availability, how fast you can get moved up.”

At the second round of interviews, students were still frequently using the internet to generate major ideas and look up information about particular careers and subject. However, it seemed as the student became more comfortable utilizing available resources on campus, like their advisors, the career center, or their professors, over time, which supplemented or replaced information that they had found via internet searches. This is very similar to major switchers as well. The first step for almost any student considering a major, whether it be an initial declaration or a major switch, is to get to get on the internet and do a general search for the subject and eventually move on to looking up career information.

**University Provided Materials or Website**

Some students also reported gathering information from materials provided by their schools, whether it be their current university or their high school. The primary source of information in this category is the university website that lists all of the degree programs. Deciding students

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4 For one example from many, a video titled “The Most Worthless College Majors” by Orangelo has over 665,000 views as of February 17, 2018, https://www.youtube.com/watch?v=1sOeLUceD8A
5 www.bls.gov
6 www.ohiolmi.com
commonly reported going to this list to look at the details of particular degree programs and using this list to help them generate ideas for majors. Despite the commonality of this latter tactic, it was extremely common for students to not know that some majors even exist as a choice for them. A few students also reported that it was daunting to them to look at the full list of majors when they were beginning their major decision making process as there were just too many options and too much information. Some students also mentioned that they used some printed materials – two pagers on majors of interest – that they acquired from the admissions office when they made their campus visits.

At the follow-up interview, some students reported becoming more proficient with the university website and how to find detailed information on degree programs, course requirements, and recommended sequences. This led to a greater propensity to start to self-advise. This can sometimes be good as the student will be more self-sufficient and will potentially use less of their advisor’s precious time and resources. However, this can be dangerous if they are looking at imperfect information (it could be outdated) or interpreting the information incorrectly. For the deciding student population, these issues are mitigated by the fact that they have a mandatory advising appointment each semester until they declare a major. Once they declare a major, however, a visit to the advisor each semester is not required for most students.

**Personality/Career Fit Assessments**

Another common source of information for major deciding students is personality assessments. These assessments often take an inventory of the interests and personality of the student and then match the student with potential fields, careers, and sometimes areas of study that are theoretically a good fit. The most common assessment that was mentioned by deciding students as a source of information was the FOCUS assessment⁷, which every deciding student took as a part of their required career and life planning course⁸. This assessment received good marks with students as most of them spoke positively about the assessment, the detailed output and the quality of its recommendations. It also included a great deal of helpful information about careers that a student could peruse at their leisure.

Students also sought out other similar assessments, often found through “Googling” as described in the section above. More than a few students specifically mentioned finding their Holland Code⁹ as part of an online assessment and found that categorization schema to be useful

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⁷ The “FOCUS assessment” colloquially refers to the Focus 2 Career assessment, a commercial product by Career Dimensions, Inc. More information can be found at www.focus2career.com.

⁸ This assessment is available to all students, deciding or not, through the standard student portal

⁹ “Holland Codes” are a colloquialism referring to the career development model known as Holland Occupational Themes published in several works by John L. Holland, such as: Holland, John L. *Making vocational choices: A theory of vocational personalities and work environments*. Psychological Assessment Resources, 1997.
to them as they explored their career and academic major options. A few also mentioned taking an assessment to find their Myers-Briggs Type Indicator\(^{10}\) and found them useful in identifying potential careers, despite one student noting that it didn’t have a great deal of scientific backing.

Whether a particular assessment measures what it purports to measure or not, these assessments can help in many ways to deciding students, as evidenced by this statement: “We also took little tests to see what kind of, it kind of tells us about ourselves and then also our values that we have and what type of things do we look for in our career … I took multiple assessments, and every time I got the same job. So, that helped a lot.” If the outputs from different assessments match up, they can give confidence and confirmation to students that need that last little push to make their decision. They can also serve a useful function to deciding students earlier in their decision-making process by growing a student’s choice set through exposure to career fields and related study areas that the students had never heard of or considered. Sometimes finding the best major fit is simply a problem of marketing, particularly for newer or more niche fields that a student might not be exposed to through other means, and these assessments seem to be an effective way to get students thinking about a broader range of possibilities.

Major switching students also reported using assessments to inform their major choices. One major switcher reported that he knew he was going to have trouble picking a major and sticking with it based on his results on assessments:

> When I was still in high school and I was doing all these surveys to think of what you should major in, they always came back into this unknown area. So like “based on your responses we can’t fit you in one thing because you basically level out.” Whenever I took something it’s just level, everything was like 50% … I’m like, “You know what, the chances of me going to university and graduating in four years with one major. That’s not going be me cause there’s no way me and my personality … like I’m going be way interested in lots of things.” So, as long as I graduate within x amount of years and as long the major that I’m graduating with is something I know gives me the knowledge and tools to do a job that I want to do … I’m like I’d be okay with it. So, it’s kind of just having all the … that mindset in swapping through majors.

This is a good example of how deciding students are often not much different than the students that come in with a declared major. This student quoted here did declare a major prior to starting college, but had an expectation that he would probably switch majors, which he already has done several times.

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\(^{10}\)The Myers-Briggs TypeIndicator is found using a proprietary instrument managed by The Myers & Briggs Foundation and published by CPP, Inc. More information can be found at: www.myersbriggs.org/my-mbti-personality-type/mbti-basics. The validity and reliability of this instrument is questionable at best, despite its widespread use.
Courses

One of the primary ways that students gather information about different fields is through exploratory course taking. Nearly all of the deciding students mentioned the required career and life planning course as a good source of information and this course will be discussed in detail in a later section of this chapter. Many of the introductory courses that can be taken for general education requirements are survey courses that overview a subject area and sometimes touch on career opportunities associated with a major in that area. Deciding students in particular are often advised to take classes in academic major areas under consideration as early as possible to get exposure to the kind of coursework a student can expect in the subject moving forward. In certain subjects that include a large practical career training component like education, students are exposed to their potential work environment in their first class in the subject. This can be a very informative experience, as evidenced by this student’s experience:

My advisor kind of pushed me to be in the class because I was like, “oh I like kids, so maybe I would want to be a teacher.” So, she [the advisor] is like, “take it, otherwise you're going to be behind.” So, I was kind of unsure about going into it. Then, as I went through the class, I kind of discovered just liking kids isn't enough to be a teacher, you have to like learning and you have to like being in school, and I just don't like that … I learned a lot about myself and then a lot about what it takes to be a teacher.

Early entrance into the introductory courses in these subjects is important for information gathering purposes and also serves to begin what are often lengthy course sequences. However, these courses that provided broad surveys that were a mile wide and an inch deep were not quite enough for some students:

I kind of wanted to get my feet wet in a couple different areas. I was hoping the classes would grab my attention. The problem I realized with that was, because they're intro classes, it's not like deep into it. That's the only thing that sucks. Even next semester, I am taking the first class in business, and my buddies are in it now, and they're like “it's not going to tell you if you like it, because it's like really general like, economic stuff.”

While course taking to explore majors was somewhat common among deciding students during their first semester, meaning that they scheduled these classes in the time prior to coming on campus, many more deciding students reported during their first interview that they were planning on actively selecting courses to explore potential major areas in the 2nd semester. It appears that the students were realizing that the coursework was an important factor in the selection of a major, despite the fact that it was not commonly stated when students were specifically asked about important factors. At the follow-up interview, these plans for course taking were borne out by reality. Nearly every student (38 out of 42) reported that they took a course during their 2nd semester with the purpose of a “test drive” for a potential major. Courses appear to increase in prominence as sources of information as students advance in school. This makes sense in two ways. The first is that they have more data points to draw on. The other is
that they realize the increased importance in interest in the classwork as a factor in the major
decision, particularly when they take a class that they don’t like.

It was much more common for students to use information gathered in a course to eliminate
an academic field from consideration as compared to adding an additional field to his or her
choice set. It was very common for a student to find that the coursework in an area did not meet
their expectations, whether about level of interest, content, or difficulty, and then eliminate that
field from their choice set of potential majors. It was not as common for a student to become
interested enough in a particular course that they are taking to meet some requirement (for
example, declaring a creative writing or sociology major after taking a course in those areas to
meet a general education requirement).

Another interesting behavior when it comes to course taking is deciding students acting as if
they had declared their major. It was not uncommon during the second interview for students that
had not yet declared their major to schedule to report that they scheduled three classes in a field
of interest for the upcoming fall semester, as exemplified by this student:

> It really doesn't make much a difference if I just wait until my sophomore year
> [to declare]. I am taking the same exact classes and stuff. I took all of the classes
> I needed going into the College of Business … But I mean like I kind of just
talked it over with my advisor, like I said, and I just kind of made my decision
> based off that. I mean I guess it would have helped going into my freshman year,
> like knowing exactly what I was going to do but I don't think it made like too
> much of a difference. It's all the same classes.

This is taking a very similar course load in a particular academic area as a major declared
student would. Thus, these students have similar behavior as a declared student without the
declaration, lending credence to the idea that the already high rate of major switches may
actually under count the number students who change their majors in practice. Some major
switchers also reported a similar practice where they would start taking a heavy course load in a
subject prior to making a formal major switch to that area. These students will often self-advise
by finding the required course sequences in online degree requirements. Even if they don’t
decide to formally switch their major to the new area, often times there is a bit of room for
electives that these courses can be applied in their current major.

**Careers Activities and Job Shadowing**

Some deciding students were lucky enough to have the opportunity to explore their majors
under consideration through job shadowing or entry level jobs in careers related to their majors
under consideration. For the relatively few deciding students that had these opportunities, career
activities seemed to have been very influential on their major decision making process, both
positively and negatively. This student found job shadowing to be the most effective way to help
make a decision on her major:

> I really didn't even know about social work going into college and all the things
> you could do with it … And then I ended up job shadowing a school social
worker … I would definitely job shadow and do things like that to make it seem like you’re actually doing it and can picture yourself doing it. That has helped me the most. Actually putting myself out there to see if I can actually do this.

She was not alone in this assessment as job shadowing was mentioned as a very effective tool by the students who took part in the activity. A few other deciding students had summer jobs that were related to academic fields under consideration as a major, like working as a summer camp counselor for special needs students or working as an assistant in an office. These extended trials give much longer, deeper, and broader exposure to the day-to-day realities of a chosen career. Deciding students that reported during the 2nd interview having summer jobs in a field under consideration were very decisive after the job regarding whether they wanted to pursue a related academic field as major. They had enough information just from that to either eliminate that option from their choice set or decide to declare a major in that area.

Some students were interested in certain subjects in theory, but then quickly changed their minds when presented with the day-to-day realities of the associated careers, like this student: “I thought that I wanted to work in a medical field. I’m a very squeamish person, so I don’t know why I thought that would work out. I job shadowed a nurse and I found out that I did not like it at all.” This is similar to the early practical placements in classrooms in introductory education courses as described in the Courses section above. This for all intents and purposes is the same as a job shadowing activity. Overall, it was clear that career activities in an area related to a major under consideration made deciding students much more decisive in keeping or eliminating the subject as a potential major.

At the time of the second interview, getting a job shadowing opportunity or a summer job in an area of interest was a relatively commonly attempted tactic for these students. Several students were successful in securing an opportunity of some sort, but many that talked about wanting to do something at least tangentially related to their major in the summer were not able to find anything. Of course, these efforts to find a major-related career activity come with wildly varying levels of effort. Some students were very diligent in working their networks to find an opportunity and naturally these were the successful ones. Others just offered vague explanations of what they plan to do with very little detail about where and with whom they were going to undertake these activities.

For the major switching and the graduating seniors, career activities in a major area were not something that was undertaken until the major was already declared and were not part of the pre-declaration information gathering process. However, career activities were a key part of the confirmatory part of the process for those that had already declared a major. Several majors include a requirement for practical experience, like student teaching, internships, or co-ops, and, just as it was for the initial deciding students, these activities played a key role in making the students surer about their choice. On the contrary, if a student had a bad career experience, the student seemed to be very likely to change their major to something else.
External Influences on Major Decision Making Process

Decisions on what field to pursue in college are not made by students in a vacuum. Depending on the student’s personal situation and personality, there exists a constellation of external influencers that put their proverbial “two cents” in to students making their major decisions. This section of the dissertation will explore who those external influencers are and the range of their influence on the major decisions of students.

Parents/Guardians

The conventional wisdom is that parents are huge influences on their children’s major decisions. If you asked someone at random why they think students change their majors so much, they might tell you that the first major choice was the one that their parents told them to pick and students switch to what they really want to do. The switching part of this equation will be discussed later in this dissertation, but the evidence from the interviews from deciding students does not back up the assertion that it is a widespread behavior for parents apply heavy pressure on students to select particular majors, as exemplified by this student:

They [parents] definitely knew that I didn't have a specific major that I was fully committed to. I could tell that they wanted me to take the time and make the best decision for myself. So, when I was trying to figure out what major to choose, they were just like, well if you don't know for sure, you should probably just go in undecided. I thought that was really, really good that they didn't want me to commit to something right away. They wanted me to figure out what was best for me.

However, this finding does come with the caveat that the deciding student population was one that did not select a major prior to coming to campus. Thus, any students that were forced to select a major at their parents’ behest were not included in the sampling frame for these interviews.

Instead of acting as a forcing function for their children to make a decision on their major, it was more common for one or both parents to serve as a sounding board to the deciding student, much like the role that the parent plays for this student:

I always call my mom. That's the first person that I call … She's always just like really supportive … She also tells me when something when I should re-think something. That's one of the reasons I want to call her because she supports me. She'll say, “I think this, but I'm going to support you either way because it's your choice now.” She did tell me specific advice like “you may have to if some of your credits don't work out or something, then you may have to do another semester.”

Students also seem to be influenced by their exposure to their parents’ careers. In an environment with limited information, it follows naturally that deciding students become more knowledgeable about their parents’ careers, just through discussion around the house and potential visits or involvement in their workplace, like this deciding student:
Both of my parents had been teachers, so that's always kind of been in the back of my mind. I knew a lot about what you had to do because I'd go to school with my dad and stuff like that. So, I knew more about teaching than anything else and I was kind of comfortable with it. That's kind of how I started being interested in teaching.

This is a similar phenomenon to that mentioned by some students that were considering education careers whose parents were not teachers. Because they had spent so much time in an education environment during their K-12 schooling, they felt most comfortable pursuing an education degree because of the level of information that they had about the profession.

Parents were also used as information sources about different majors and associated careers, especially when parents have either majored in or worked in areas of interest. They were also reported in a few cases to have provided information on the local economy and the job outlook in different areas, even if the career was not in their line of business. Sometimes parents will remind students to consider factors that are important to them, most often the pay levels that associated with different majors. One student remarked that he consults his parents in this way: “I see what they think. I'll say, ‘I was considering teaching,’ and they'll say, ‘You know how much they get paid, right?’ and I say, ‘Good point.’” Parents also sometimes act as connectors for networking to other potential external influencers. One student said that, “My mom knows people who work in certain fields that are related to the ones that I am considering. That’s a big deal for me.” The networking opportunities are big deals to the deciding students as parents are often a source of job shadowing opportunities or other such chances to gather information on fields of interest.

While parents were often big influences on deciding student major decision making, there were certainly some students that reported that their parents were not influential. It is also not uncommon for a student to rely on one parent and not consult with the other. While the quality of the relationship with the parent plays a large role, the other main reason for this is a lack of information in major areas under consideration. It was stated by several first-generation college students that their parents were not very influential in their choice of majors other than providing some broad recommendations like “find something that will make you a lot of money.” One particular first generation student reported that his father was actively discouraging him from even attending college because of the successful career that his father made with just a high school degree.

At the time of the follow-up interviews, the role of parents in this process really hadn’t changed for most of the students. The students that did declare their major or college in the intervening time between the first and second interviews often reported that they ran the major choice by their parents prior to actually declaring, using them as a kind of sanity check before they actually went through with it. All in all, deciding students were most likely to use parents as idea generators and sounding boards during their major decision making process. For the most part, students were not pressured to select a particular major based on their parent’s wishes and the students were left to find their own with some guidance if they wanted it. However, there
were a few instances of parents being highly suggestive to the point where one student declared a major mainly based on the parental influence.

Major switchers and graduating seniors report a similar role for their parents. There were a few that reported that their parents did not approve of their final major choices due to the perceived low pay level in careers associated with the major choices. These students said that this influence made them reconsider their choices, but ultimately, they elected to remain in their chosen major. Overall the role of parents in their major decision making process was similar to that of the deciding students – as an advisor and sounding board.

**Extended Family**

Deciding students very commonly cited influences from members of their extended family, including aunts, uncles, and grandparents. This group’s influence on the major decision making process is not unlike that of parents, particularly when there are close relationships between the student and the relative. In general, the influence of extended family members tends to be more transactional than that of parents. Extended family were often consulted when they have particularly useful experience or knowledge in areas of interest to the student. It was not uncommon for a student to reach out to a distant relative if, for example, the student was interested in accounting and his great uncle owned his own accounting practice. Extended family members were also used to supplement a lack of knowledge by parents or guardians. Several first-generation college students (meaning students whose parents did not have a bachelor degree) reported turning to college-going or degree-holding cousins, aunts, and uncles for general advice because of their greater experience on campus. At the follow-up interview, several students noted that they set up job shadowing opportunities or summer jobs in a field of interest using their extended familial network.

Extended family were also cited by some deciding students as being more forthright in their commentary as compared to their parents, such as this student:

> My closer family, like my mom, will listen to what I have to say and then go off of that. Whereas great-aunts and uncles and stuff, they are blunter like, "Don't do it. Really, don't do that." I normally take their comments with a grain of salt. I'm like, "Okay. Yeah. Sure. But I'm going to do what I want to do."

It appears the distance that comes with not living in the house with the student or having to deal with as frequently allows them to be very frank with their commentary. So frank, in fact, that multiple students reported that some of their classmates just declared a major (even though they were undecided in practice) just so “they had something to tell their aunts and uncles” and avoid commentary on going into college with declaring a major. Siblings are often quite influential as well, but this will be covered in the “peers” section, as influential siblings tend to be close in age to the student.
Peers

Fellow students and siblings were very commonly reported as having a big influence on the major decision making process of deciding students. Whether the consulted contemporaries were friends, acquaintances, classmates, or siblings, their influence can be broken down into two broad roles: practical problem solver and commiserator. The vast majority of interviewed deciding students resided in on-campus housing, so they spent the majority of their time with peers enrolled in the same university. Major choices were a very common point of discussion around the dorm, exemplified by this exchange:

Student: I talk about it [major choice] all the time with them. I just kind of like tell them "I'm going to try this," or "I'm going to do this."
Interviewer: Is that feedback important to you or do they ever tell you anything useful?
Student: Yeah. Not really. I guess they don't really know much more than I do because they are in the same boat as I am.

When this student says that her fellow students “are in the same boat as I am,” the student does not mean that all of her peers have also yet to declare a major. Many deciding students report that a lot of their peers that have officially declared a major prior to their freshman year are just as undecided in practice as they are. This is, of course, borne out by the large percentage of declared students that change their major, sometimes multiple times. During most of these conversations, peers acted as sounding boards and commiserators to each other, providing an outlet for a major decision-making student “to bounce ideas off of someone.”

Peers, especially those that are a year or two older than a student that study in an area that is under consideration by the deciding student, can often serve as sort of an academic advisor that has in-depth knowledge of degree requirements and other aspects of a degree program. One deciding student was a member of an organization on campus that exposed him to a number of older students that were majoring in a subject that he was considering. This gave him the ability to get detailed information on degree requirements, the difficulty of the classwork in different specialties, and even recommendations on professors to go talk to for information gathering purposes. Membership in a Greek organization or a sports team can often expose students to peers that can be helpful to their major decision-making. Another benefit to consulting older peers during major decision making could be more accurate information. One deciding student had an older sibling that was a soon-to-be-graduating senior in the one of the fields that the deciding student was considering. The older sibling was able to provide current labor market information including job availability in a geographic area of interest and potential starting salary range.

At the follow-up interview, most students had developed a larger network of peers, which expanded the potential network of peer influencers. Some students who were undeclared or had only declared a college and still need to decide on a specialization at the time of the follow-up
interview reported that they were able to draw on the expertise of friends in their areas of interest, like this student:

I get information from them, most of my friends. And I always hear someone talking about, you know, business school is really good. There's so many things you could do through business schools, so I was intrigued. One of my friends is a really, really smart dude and I enjoy talking to him. So, I would ask him questions here and there. You know, one of my buddies is in supply chain management. Still really don't know what that is, but I kept talking to him. And then I have some friends from my hometown who are doing marketing. So, I'm hearing all these different options and it's intriguing to me.

Overall, it seemed that the influence of peers on deciding students’ major decision-making process grew over time from the first interview to the second interview.

This pattern certainly continued over to the major switchers. Peers became a much larger influence on subsequent major choices. This makes natural sense as many students’ support systems begin to slowly transfer from their parents over to their peers, who they see and interact with much more frequently. Peers are often good sources of ideas for new majors – popular majors with good career prospects spread by word of mouth.

**Academic Advisors**

Most students report that their major decision making process has been influenced by officially assigned academic advisors in some way, but the range of experiences are quite large. Some deciding students had more than one officially assigned academic advisor. Beyond the pre-major advisor that all deciding students are assigned, some students also had advisors through their membership in the honors college, intercollegiate athletics, or another program designed to give assistance to low-income first-generation students.

All of the deciding students are assigned a pre-major advisor that specializes in providing guidance to students making their initial major decisions. Deciding students are required to meet with their advisor once in the fall semester prior to scheduling classes for the spring semester. All students also met with an advisor, not necessarily their assigned advisor, during new student orientation as well. At the time of the interview, all of the deciding students had met with an advisor twice and with their full-time assigned advisor at least once.

At a minimum, academic advisors helped deciding students find classes that will allow them to explore areas of interest and gather additional information about the academic areas under consideration. It was clear from the deciding students interviews that students were spurred to take classes that may not have otherwise taken that were helping them make progress on their major decision making. Even at the time of the first interview with deciding students partway through their first semester, some students had already eliminated some potential major choices because of lack of interest in the coursework in classes that were suggested by an advisor during scheduling in new student orientation.
On the other hand, other deciding students were heavily reliant on input and information from academic advisor, such as this student:

I would say I've met with my assigned advisor about six times [during first semester]. I met regularly with academic advisors [from other colleges], and I have had them fill out graduation plans with me for all of the specified majors that I am considering. I saw what I would have to do over the next four years to obtain that certain degree, and that's just kind of pushing me more towards exercise science.

This student met with her assigned advisor five additional times beyond the one required visit during her first semester on campus and the semester was still ongoing at the time of the first interview. She even sought out and visited college-specific advisors in her major areas of interest to provide a more in-depth perspective on what is required to graduate for each potential choice.

Advisors also played a role in expanding the choice set of deciding students. There are a large number of potential majors available and it is often the case that students are simply not aware of some of them that might be of interest to them. Some deciding students were also not aware or hadn’t thought of the option of minor or double majoring a subject prior to a suggestion from an academic advisor, like this student:

She [the academic advisor] told me about majoring in sports management, and then taking a minor in marketing, which I didn't consider at all, doing a minor in marketing, but I thought, "I don't think that would be a bad idea." … I figured it would just be easier to get a job with a minor in marketing. It kind of just helped me narrow it down more.

While many pre-major advisor appointments are focused on getting deciding students into the right classes to explore their interests, students with additional advisors in the other previously mentioned programs reported that they were able to spend more time simply discussing their thoughts on different majors. For instance, intercollegiate athletes meet with their advisors weekly and honors advisors are co-located with those living in honors housing, increasing the convenience or number of opportunities to discussions on potential majors.

At the follow-up interview, it was still very common for deciding students to rely on their advisors to suggest courses that would help them explore their areas of interest. A few students also reported that their advisors had suggested some potential majors that the students hadn’t even heard of prior to the suggestion, like tourism, leisure, and event planning or visual communications technology. These majors often prove to be popular with students, but suffer from a marketing problem of sorts in that they aren’t as familiar to students due to their unique interdisciplinary nature or their lack of fit with traditional career archetypes.

For major switchers, advisors often became key influencers in the major decision making process. Often times, students would be switching within the same college, meaning they would retain the same advisor after the switch and the advisor had in-depth knowledge about both the original major and other majors under consideration. One major switching student reported that a roommate was counseled by an advisor to seriously consider a major switch due to poor
academic performance, even though the student was technically on senior status. The student’s track record was such that he was unlikely to be able to reach the minimum GPA necessary for graduation and the best way for the student to graduate was to change majors into something where many credits would apply but would contain less challenging coursework.

**Professors**

About half of the deciding students reported having their major decision making processes influenced by professors or high school teachers. However, it is important to note that many of the professors cited as being influential were professors in a required career and life planning course that was designed to be influential on this process. The larger effects of this required course for deciding students will be discussed later in this dissertation. Nevertheless, professors were often influential on the major decision-making of deciding students who did take the time or get the opportunity to converse with them.

Setting aside those that spoke about the career and life planning course, students were most likely to discuss major decision making with professors at events outside of the classroom designed to facilitate these interactions. There was an on-campus event that was held in the weeks prior to the first round of interviews with deciding students that was designed to give major exploring students an opportunity to speak first hand with representatives (both faculty and students) from a wide variety of degree programs. This event was helpful to a number of the students as it gave an opportunity to expand choice sets of students by exposing students to major they may have not known about. It also gave students a comfortable environment to ask questions about majors and careers to professors, something that was reported to be a little awkward at times after classes. While this seems to be a somewhat trivial difference, it is important to remember that these are mostly 18-year-olds that are still finding their way away from their parents or guardians.

Those deciding students that did consult with professors generally had good experiences and found them helpful, like this student:

> As part of one my classes, I had to do an interview with someone and I chose a professor that I met at the major match-up event. So, I got in touch with him and we sat down for an interview and we talked a lot about what you can do with a history degree and how he took his degree and what he did with it in his career.

This is a good example of the unique influence that professors in an area of interest for major deciding students. Academic advisors are familiar with degree programs and course sequences, but, unless you have a parent or relative in a career field of interest, it may be difficult to find a source of information on career options. This is where professors can be very useful, particularly in academic fields where the tie between subject matter and career, such as history or political science, is less readily apparent.

At the follow-up interview, a few additional students reported that they had spoken to professors regarding their potential major choices in the intervening semester and half, likely due
to exposure to additional professors through class taking. The advice and information provided to these students was very similar to that reported at the initial interviews. One student reported that a professor helped facilitate a job shadowing opportunity over the summer. Given that it was a very niche field, it may have been very difficult for the student to set up something similar herself without the professor’s assistance. Another thing that did come up frequently in the 2nd interview was students eliminating a potential major choice from their choice set due to a professor that they didn’t like in a course in the area of interest. A couple of students noted in a few different fields that they encountered a professor in an introductory class that they didn’t like and, when they found out that this same professor would likely be teaching a number of their major specific classes, decided to eliminate the major from their choice set.

Overview

Every student relies on outside advice to some extent and is influenced by people around during their major consideration process. Parents are a huge influence, especially for those students making their initial major decision. Contrary to popular belief, most parents acted as trusted advisors and supporters, rather than demanding particular choices. However, there was some evidence of parents taking on a more coercive role in their child’s major decision making. Extended family member can also influence choices and can also act as valuable sources of information or employment opportunities if they have experience in an area of interest to the student. Advisors and professors can provide in-depth knowledge of course sequences and degree requirements. Professors are often good sources of knowledges about career opportunities associated with each major. Lastly, peers seem to have a large influence on major choice, particularly on major switching. As students advance in their college career, they are exposed to more and more peers that have a wide variety of majors and career plans that can serve as examples for their own paths.

Career and Life Planning Course

One of the notable features of the university’s program for deciding students is the requirement for each deciding student to attend a career and life planning course designed to help with the transition to college and help students explore potential majors and careers. This was a credit bearing class with a curriculum designed to facilitate self-discovery and career exploration for the students. In particular, the curriculum had students take self-assessments, write self-reflective essays, conduct interviews with professionals in industries of interest, and attend a job expo, among other things.

One of the key findings from the interviews with the deciding students is that many of them display very linear thinking that ties academic major choices now to lifelong careers in that area. Because of this, students are more reticent to choose a major. However, at least one deciding
student felt comforted by the curriculum of this course that showed that a major choice was not like signing a lifelong contract in that field:

Student: My teacher, he skipped around from a lot of different jobs and majors. His degree that he finished school with was social work but then he went to an athletic director to a teacher, so he did all this stuff, and then he would also call some of his friends and they would just kind of explain their career path to us, so it was really eye-opening to see, just because you major in something doesn't mean that's what you're actually going to end up with. So yeah. And just activities that we did, self-interest stuff and the Holland code things, that kind of helped out to see where I was.

Interviewer: So, did that make you feel better about potentially making a decision?

Student: Yes, because then it wasn't like, it made it less concrete. It made me feel like there was, just because I majored in this one thing, I wasn't stuck in that one subject for the rest of my life … like there was space to do other stuff.

The realization that there is “space to do other stuff” with your life, other than exactly what you majored in seems to be an important realization for these students and one that when made can take some pressure off of the decision on academic major.

There was generally widespread praise for the course and the vast majority of deciding students thought that the class was a positive in the major decision making process, but there were a few quibbles with the curriculum. The biggest problem that the deciding students had with the class is that there was too much “busy work” and assignments that seemed repetitive. A few students wondered why there wasn’t more emphasis on the majors in the curriculum as opposed to careers. Their feelings were well exemplified by this student:

It didn't really help me in how I thought it would help me. It kind of, it's more of like a resume focused class that will help you with jobs … Honestly, I went into the class hoping I could learn about a bunch of different majors and stuff like that, but that's not really what happened. I thought it was maybe a little too career focused, rather than major focused.

Naturally, there was another student that specifically called out the resume building sessions as being the highlight of the class, demonstrating the difficulty of designing a one-size-fits-all curriculum for students that have had a massive range of life experiences, familial guidance, and work experience.

Beyond the resume writing portion, there were other parts of the curriculum that were particularly well received. Several students noted that they got a lot out of the assignment to find and interview professionals in careers of interest about their career paths. Most had never had the opportunity to talk to someone that wasn’t a relative for half an hour about their career and ask about whatever they wanted. Others highlighted the Holland occupational codes as being quite useful in equating their interests with potential careers. Deciding students also liked the major matchup event and the opportunity to talk to a professor and a student from each academic area that they were interested in majoring in.
Potential Career Outcomes and Major Choice

For many students, major choice and career choice are one and the same. Students that are in professional training programs like nursing or K-12 education are really choosing what their career will be when they select their major. For others, there is more wiggle room, although many students don’t see it this way, at least early in their careers. Students nearing graduation were asked about how they view their potential career options now that they are preparing to enter the labor market in the near future. One of the primary comments in this area was that the students lamented the fact that their major didn’t require an internship of some kind, exemplified by this student: “A lot of fields push it [internships] more than others do, like computer science. Others are like, ‘We don't care, do whatever you want to do.’ And then you wait until after you graduate before you go out and get a job, and they're like, ‘You don't have any work experience, what the hell?’” One might argue that there was nothing stopping this student from going out and getting an internship anyway and that would be correct. However, those majors that do have required internships or co-ops often have partnerships or other infrastructure in place to help place students and smooth the process of finding meaningful work experience.

One option for a graduating student if the labor market options are not thrilling is to go to graduate school to either train further in the major area or change tack and get graduate training in a different subject all together. This student, who was two semesters from graduation and had previously majored in chemistry and computer science before selecting geology, was having trouble making up their mind:

Am I going to go to work, or am I going to go to grad school? And I've been told various things. If I'm going to go to grad school, I should do it right after undergrad, because then I will still have the, quote, motivation that I still, apparently, lack right now. Or I can go to the job market that is, apparently, losing a lot of people, because a lot of the geologists are old guys who are retiring or dying. I haven't really given it much thought, which I really need to. When I was a chemist, or when I thought I was going to be a chemist, I didn't really give much thought to it then, but definitely, for the computer science, it's a technological world right now, so there's really a lot of jobs out there, so I didn't think that I was going to have a lot of problems. Currently, there is still a lot of ... quite a bit of a job market for geologists, but that's probably going to decrease once oil, and gas, and things go downhill.

Another behavior that was shown by some seniors was to hedge their bets in the labor market by adding a minor or a double major. One senior was majoring in German language education. Since German is not offered as a foreign language as widely as other languages and is being dropped at some schools, this student also added English language arts (ELA) as a double major in between her sophomore and junior year. She did this for the sole purpose of having a back-up subject to teach in case the labor market for German teachers continued to shrink and she could not find a job. This decision to double major required her to take heavy course loads in each semester and required her to stay in school for an additional two semesters. This student paid a
sizable cost in tuition and opportunity cost for the choice to double major, but it does leave her well-positioned in case of the disruption in the labor market of her primary choice.

Knowledge of Pay Levels Associated with Different Majors

The pay levels of careers associated with different majors were stated by many deciding students to be a very important factor in their major choices. However, if deciding students want to accurately use pay as a factor to rank potential majors against each other, this requires students to have accurate information about the pay levels of careers associated with those major choices. In effort to test the knowledge about average salaries associated with different majors, all 49 deciding students were asked what they thought was the average salary in the 10th year of their career of people holding a bachelor’s degree only in the majors they were considering. They were asked to provide their best idea of this 10th year pay level for each of the major fields under consideration. This was then compared to the actual 10th year pay levels of different majors as reported by the PayScale College Salary Report 2015-16\textsuperscript{11} and discussed with the student. The data from PayScale have a large sample size and have been found to be highly correlated with U.S. Census data on salaries by major\textsuperscript{12} and, thus, an appropriate source to use in this context. It is also a source that would have been widely available to the students, as the PayScale report is a highly-ranked result in internet searches about pay levels by major.

Deciding student responses were coded into two categories, “good” and “poor”. For those students whose knowledge of salaries by major was “poor”, those responses were further coded as “incorrect by magnitude” and “relatively incorrect.” This is an important distinction in the major decision-making context. Since pay levels are being used to rank potential major choices against each other, being able to rank in correct order from most pay to least pay is of utmost importance. If a student is off in his relative rankings of the salaries of different majors, they may be making a major decision based on false information. If a student has poor knowledge of the magnitude of the salaries associated with different majors, he or she may be very disappointed (or very excited) when they receive a job offer after graduation, but at least this poor knowledge shouldn’t necessarily affect the quality of the major decision.

As a whole, deciding student knowledge regarding salary levels associated with different majors was fairly poor. Only 16 of the 49 deciding students interviewed had good knowledge of the salary levels associated with their potential majors under consideration. This means that they had their potential majors ranked by pay in the correct order and were generally close on the

\textsuperscript{11} https://www.payscale.com/college-salary-report/majors-that-pay-you-back/bachelors
\textsuperscript{12} Rothwell, Jonathan, and Siddharth Kulkarni. "Beyond College Rankings." Brookings Institute, 2015
magnitude of pay of each major\textsuperscript{13}. Some students’ knowledge of the magnitude of pay levels was shockingly poor. One student thought her three majors under consideration would pay between $5,000 and $10,000 annually\textsuperscript{14} in the 10\textsuperscript{th} year after graduation. Noting that a 40-hour work week at the Federal minimum wage would work out to be just over $15,000 annually, this suggests a massive lack of financial literacy in general. On the other end of the spectrum, another student, who said that pay was the most important factor in his major consideration, thought that the average salary at the 10\textsuperscript{th} year after graduation for each of his four potential major choices was $45,000 to $75,000 higher than the actual values. Perhaps it was just wishful thinking from someone that wants to be highly compensated.

Despite the fact that errors about the magnitude of the 10\textsuperscript{th} year after graduation pay levels were rampant, errors on the relative ranking of different majors by average pay level were less frequent. Just nine of the 49 deciding students interview had significant problems with ranking majors in relative order by pay\textsuperscript{15}. Even the student with the egregiously high ideas of the salary magnitudes described above had the majors ranked in the correct order by salary. This means that most students using pay as a factor to rank potential major choices are doing so with at least passable information on the factor. Nevertheless about 20\% of this sample of students is using poor information on this subject to help make their choice, so there is still some room for improvement.

Should All Students be Undecided?

Deciding students were asked whether every freshman should be required to enter school without declaring a major. This inquiry was inspired by policies in place at other universities, including the Massachusetts Institute of Technology and the California Institute of Technology, that require that all students wait until after the end of their freshman year to declare a major (or “academic option” as it is referred to at Caltech).

For the deciding students, the response was overwhelmingly positive towards requiring all freshmen to enter without declaring a major. First, it must be recognized that there is significant confirmation bias present here because, by definition, these students chose to enter without declaring a major and most of them, at least at the point of the first interview when this question was asked, were feeling positively about that choice. Nevertheless, several of the deciding students’ reasons why they thought all freshmen should come in undeclared were instructive.

\textsuperscript{13} Most students tended to be a little low on their estimates, which may be due to the fact that comparison salaries were national averages. Pay in the Midwest, where the university at which the interviews took place is located, tends to be lower than pay in coastal areas.

\textsuperscript{14} It was confirmed that the student knew the question was about annual salary.

\textsuperscript{15} Majors with materially similar levels of pay transposed in order not included.
Several students said that it was a big benefit to have taken the career and life planning course that was required of all deciding students, as it provided a wealth of information that they didn’t previously have about careers, majors, and themselves. This course is open to all students but isn’t frequently taken by students that have already declared their majors.

This student thought it was important that students come into campus with an open mind:

They should probably wait (to declare a major) until they have some time on campus. College kids are at a very ... It's basically second adolescence. So, values are changing, they're going to start seeing things they haven't seen before so some guy that like, "oh I'm going to become a business man" and he might just take an elective like in the arts and he'll change his mind. He might become a theater management or something.

This quotation alludes to an idea that other students specifically stated – that students with a declared major, even those that are undecided in practice and just declared something because they thought they should, are mentally anchored on that subject and do not consider other options with the same open mind that an undeclared student would.

Deciding students thought that since the first year was mostly spent taking general education requirements anyway, so why not spend it exploring potential major choices before deciding? Of course, there is nothing structurally in place to keep decided students from doing that, but several deciding students thought that in this scenario decided students aren’t as likely to view the general education classes as tryouts for potential majors since they have already declared a major. Other students noted that there were several majors that they had never heard about until they were on campus (actuarial science, data science, and visual communication technology, for a few specific examples) that they might not have considered or been exposed to had they not been actively exploring options for majors.

Another deciding student thought freshmen are sometimes not ready for the intensity of some of the major-specific coursework:

I think there's definitely an advantage to being undecided. I think it gives you time to relax, because I think a lot of people right now who have decided on a major are so overwhelmed right now. They don't know what to do with themselves. They're already taking major specific courses that are hard courses and they're not used to that kind of intense environment yet because they're coming out of high school.

Several other students independently agreed that beginning school without a major is the best choice, but also suggested that most students should ideally choose before they begin their second year. These students suggested that waiting any longer than that might start to delay graduation beyond the standard four-year timeline.

One graduating senior took the concept of entering undecided even further by saying that students should take a year off before coming to college to think about it:

I'm honestly a huge proponent of not going to college directly out of high school. I think that's part of the problem why majors are shifted so often how ... And
people come in not knowing what they want to do. They change their major so many times throughout college and then either end up getting some broad degree that they don't know what to do with, or end up dropping out because still after four years they're like, "Oh I still don't know what to do." So, then they drop out. I think it's just because society's influence of, "You have to go to ... Everyone has to go to college. You have to go right away." When that's not the case. It's just pressure too much that right after high school when you don't know what to do that you're going to be there and you are going to choose.

Most of the major switchers and graduating seniors from the focus group didn’t think it should be required to enter college without declaring a major. However, the consensus was that if a freshman has any doubt about their major at all, they should come into school undecided and just try a few things about before declaring.

**Initial Major Consideration Process**

As evidenced by the prior discussion of the timing of major consideration initiation for deciding students, there are a wide range of major consideration processes. Some students begin their processes as children and other don’t begin to consider what to major in until after they have chosen a college and taken a few classes. This large variance continues over to the consideration process itself. Some deciding students have very rigorous processes to gather information about various major options and then move on to try out the areas through systematic course taking and job shadowing activities. Others are incredibly laissez faire about the whole process and think the right major will just come to them in time. This statement from a deciding student exemplifies a middle of the road major decision making process:

I had kind of small ideas, but I never really thought about it much before that (scheduling classes during orientation). And he (father) found Tourism, Leisure, and Event Planning because I want to travel a lot with what I do, and he found that. And so, that really got me thinking and then I was thinking about other ones that just randomly popped up that I saw … I was kind of always set on not a lot of options because I knew exactly I didn't want to be in school for a long time, I didn't want to take Chemistry classes or too hard of classes or labs. I knew I never wanted to be in an office necessarily with the career that I went down. And so, these fed the best options and made my list (for further consideration).

The consideration process was not too regimented, involved some serendipity, and came with a little bit of input from the parents. These findings support the major decision making model as postulated earlier in the dissertation. Students don’t often just pick a major directly from the long list of majors on offer. A student’s first step is often to eliminate potential major options that they know for sure aren’t options, whatever the reason. Most students reported that it was much easier for them to figure out what they don’t want to do or study in. The students are creating a reduced choice set that allows them to focus their search on a reduced number of more likely options. Why would a student waste their time looking through the long list of majors, when they know that they don’t want to take another math course? Deciding students would often just eliminate
majors that don’t meet that criterion and concentrate their efforts on a more efficient search through options that meet that base criterion. They create a reduced choice set that they can consider more seriously by weighing their merits using the factors that are important to them and gathering information from human sources and through course taking and other means. The details of this consideration process will be described throughout the rest of the chapter.

**Range of Potential Major Choices Were a Factor in College Choice**

For deciding students that entered college without declaring a major, it might be counterintuitive to say the potential majors were a factor on where the student chose to attend college. If they don’t know what they are majoring in, how could it be a factor? Nevertheless, a handful of deciding students indicated during their first interview that the broad range of majors available at their university was a major factor in decide to enroll there.

Student: [My university] has way more options for majors. There's very limited science programs at [another university], hardly any at all. Like nursing, health, anything. Mostly a lot of business. They have mental health but that's not what I want to do. I got into the honors college and that was a big factor ... That would make it a smaller college for me. I would get the smaller class sizes and that also I will be with people closer to my GPA I guess. This place had so many major options and that was a big thing for me.

Interviewer: Your majors did affect your choice, but in a way, not that there's a particular high quality major, it's that there were a lot of options. It allowed you to be as undecided as possible.

Student: Yes. I knew that if I went to my other choices, that I would limit what I would have been able to do.

Marketing the breadth of a university’s major offerings as a way to potentially attract more undecided students is likely not a strategy under consideration by too many universities, but there are at least a few students out there are using that as a factor in their college choice.

**Deciding Student Major Decisions and Declarations**

As described earlier, a majority of the deciding student sample had either formally declared or had decided on their major and planned to formally declare when they returned to campus at the time of the 2nd interview between their freshmen and sophomore years. These students were asked how they finally come to the realization of what they wanted to study and was there any particular event that put them over the top. There was a wide range of responses from students. One student reported that she declared their major of choice the day after her first interview and said that talking through her decision-making process and what was important to her made her more sure about her choice. While it certainly was not the intention of this project to spur action from the interviewed students, perhaps it does show the benefit of spending a little more time with the students so they have an additional forum of some sort to discuss their thinking.
One student put his ability to decide on a major down to learning about himself and what he likes to do:

So, we kind of looked over like, accounting and different things like that. And all these different, really broad topics. And I just, I don't know. I guess I never really saw myself pushing a pencil into a desk, but with Computer Science, I can see myself figuring out different problems and solving things. I learned a little bit about my personality, and I guess me as a person, I like to, I guess dissect things and kind of look at everything in its own different way and its own different part, and break things up until I have a complete and working, functioning thing. So, I guess it kind of made sense to want to be a Computer Scientist and such. It’s basically what we do.

This student was hopeless and never thought she would pick a major, but this changed after she volunteered in the field and did a job shadow:

Student: Yeah. I think I had been thinking about it for way too long. I was just talking with some friends and they were like, "I think that you will probably stay undecided forever. You need to just hurry up and pick one." And I was like, "Yeah, you're right. Like, I could probably just stay undecided and graduate with an undecided major." And so, I was just like, I knew that was number one and that ... and I did do a volunteer thing and, just like I said before, how I had job shadowed and stuff and I just ... Finally, I just committed and decided to do it.

Another student just needed more time to gather information and feel comfortable with making a decision on a subject:

Whenever I have to make a decision, I sit there and do a lot of research and I have weigh out every single option, so it just took me a really long time to actually sit down and figure out what I wanted to do. I already accepted that it could change eventually, like if I don't want to do what I want to do, like it could possibly change for a time and just allow myself to relax and be like, "Hey, this might change." I don't know; it's really hard. Sometimes when I think about it, I don't acknowledge it. It's like, "oh s***", oh sorry for cussing ... I made this decision, but, I don't know. It just took me a really, really long time to actually do my research and pick out exactly what I want to do.

Even though this student did declare a major, it is obvious that some uncertainty remains. This again fits the conceptual model that students are constantly evaluating their major choices, even this student had just declared her major just prior the interview. Another deciding student was planning on potentially leaving school in the next year or two for a professional sports career and decided on a field that he thought would be applicable to his potential post-sports career, but also one that lent itself to completion by taking a few classes at a time over the summer to eventually earn his degree while he was still a professional athlete.

As evidenced here, there is wide range of reasons why students finally get to a place where they feel comfortable declaring a major. Students are often searching for that magic bullet or bolt of inspiration that make them 100 percent sure and comfortable about their major choice. However, the reality seems to be that this level of certainty will never come and the comfort level with a potential major choice is built up over time through information gathering, self-
reflection, and potentially course taking and career activities. It is not about becoming 100 percent about the major choice; it is about becoming certain enough about a potential choice to feel comfortable declaring a major. This just takes time, quite a bit of it for some students, and the realization that they still might change their mind in the future.

**Personal Deadlines**

For deciding students that hadn’t yet declared a major at the time of the 2\textsuperscript{nd} interview, it was very common for them to start setting deadlines for themselves to decide a major. This was discussed by some students during the first interview, but discussion of personal deadlines certainly became more prominent during the second interview. This student is a good example of this line of thinking:

I think I’ll really start deciding, really, in the Spring of this [sophomore] year. But I’d like to be declared by the start of my Junior year, for sure. If not, I think I’ll maybe plan to come back home and not spend so much money undecided … Really, I’m just taking these classes and seeing how I feel about them, and how I can apply them to any of these careers and if I’ll like that. Continually going forward, and if I can build off it. You know? Build off these skills.

**Giving in to Parental Concerns**

The influence of parents on a student’s major decision-making can be large as detailed in earlier in this chapter. For most students, parents serve as a source of information and a sounding board. For others, more rarely, parents can be highly suggestive of certain options. Since these students were all by definition undeclared at the time of the first interview, these students had been able to successfully fend off any external pressures to declare a certain major. However, by the 2\textsuperscript{nd} interview, two students had declared a major due to pressure from their parents, including this student responding to a question about the process undertaken to come to a major decision:

Well, I didn't really look into the different things that I could do. It was more of a, I had to think really hard about it. I had to spend a lot of time and just think over it. Some days I just sat for a couple of hours in a chair, just thinking about it and I just decided to go with business. It was also what my dad wanted me to do and I told you that I hold his word up high.

This student went on to explain that the parent was pressuring the student to go in to the family business and it was much “less stressful” to go with the major that was pre-approved by dad. The other student intimated that parental financial support could dry up if she didn’t choose a major soon and felt pressured to pick something quickly.

**Increased Savviness Navigating Campus Resources and Academic Program Requirements**

Another notable change in the deciding sample at the time of the 2\textsuperscript{nd} interview was that many students displayed a greater knowledge of degree requirements and of the resources available to them on campus. A good example of this was that several students had not even contemplated a double major or did not know how to formally declare a major during the 1\textsuperscript{st} interview. This
Student was responding to an inquiry about why he declared a major at 2nd interview after not having mentioned that subject in the first interview and demonstrated great resourcefulness in overcoming a barrier to declaring a major of interest:

Student: No, I've always had an interest in computer science, and I chose it because I found, not a loophole, but an easier route to be able to get a degree in that. I didn't want to have to do four years of Spanish or any real foreign language because I'm not good at those types of foreign language, but anything computer I can learn and I can take sign language as the language credit, so that was my new thinking.

Interviewer: Taking foreign languages in college is pretty hard, if I recall. So, you don't want to take Spanish or foreign language. Was that a major road block to you selecting this major before you figured this out?

Student: Yeah, it was that and math were pretty intimidating but I'm fine with the math now and the language I don't have to worry about because sign language is a lot easier than to remember something when what it means in English, when you're doing it with your hands as opposed to learning a separate speaking language.

This is a student that had eliminated all majors in the college of arts and sciences from his choice set at the first interview because of practical academic considerations – all of those majors included a foreign language requirement that he didn’t believe that he could handle. Putting aside the wisdom of not choosing a major of interest because of two required language classes, he was able to find a way to open up a whole section of majors to himself just by learning about course offerings and degree requirements.

Potential Transfers to Other Universities

As detailed in the beginning of this chapter, four of the 47 deciding students that completed their 2nd interview transferred away from the original university to another four-year or two-year institution. All of these students reported that they transferred for personal reasons. However, there were a few other students that had explored a transfer, but decided to stay at the original university, like this student speaking about her recent major declaration:

It was pretty spontaneous. I was going to go back to another school next year for dental hygiene and the dental hygiene program didn't accept me. I kind of looked at it as a blessing, because I realized I really didn't want to do that. Architecture was always in the back of my mind. It was still kind of spontaneous, because all of a sudden I was like, "All right, I'm calling to declare. This is what I'm going to do."

This thinking follows the conceptual model developed earlier in this dissertation. Students are constantly reevaluating their choices, both where to go to school and what to major in. Often times, one of those decisions can really drive the other, like in this case when the student was going to transfer for the sole purpose of majoring in dental hygiene.
**Barriers to Major Declaration**

In some cases, students are ready to declare a major, but do not or cannot do so because of some sort of institutional barrier. The simplest of these barriers is the requirement of a physical advisor signature on a form to declare most majors, which requires a visit to an advisor. This seems incredibly trivial, but logistical planning such as this can be difficult or undesired for some students. This barrier doesn’t deter people from declaring a major at some point, but can delay the declaration and the commencement of a relationship with an area-specific academic advisor, who often has greater knowledge about their field of choice than a generalist pre-major advisor.

Some majors also have competitive admission or at least relatively high academic standards for admissions and these can be serious barriers to some people. One major required students to have a certain amount of volunteer hours at two different organizations and gain letters of reference, along with a few other requirements, prior to applying to the major. For one deciding student, this was a significant barrier, just as much interpersonally as it was logistically:

> When I first got to college, I sucked with people. I cannot talk to a person. It's horrible. But yeah, that's the toughest part was going out and getting the jobs [volunteer work required to declare a major] and asking people. You had to get a good relationship with them and then you can ask them for the reference. First you had to talk to them and you worry about not offending them and it's a lot of work.

Ultimately, this student did apply to this major and was accepted, so the barrier was overcome in this case. In other cases, the minimum academic requirements for some majors can be insurmountable. There is a popular major that requires a 2.5 grade point average and passing a calculus class with a C or better to declare once you are on campus and this can be a serious barrier in two ways. For students with a weaker math background, students may have to take up to four math courses before they even get to the required calculus class. The other is if the student begins his or her academic career very poorly (which can be common due to the difficult transition both personally and academically from high school), it can be difficult to for the student to improve their grade point average to the required level in a timely manner.

**Major Switch Consideration Process**

While there are some important differences, the major switch consideration process appears to not be that much different from the initial major consideration process. This is likely because students are rarely 100 percent certain about their major choices, so the choice is almost always under at least some level of reconsideration most of the time, as this student reports:

> I'm definitely not changing my major again, but it's a constant conversation topic. Especially, my two roommates are both graduating. The ones graduating with a communication degree, but is not happy with the degree. Already knows that's not the degree she wants but she's made it this far so she decided to graduate. My other roommate was undecided for over two years and finally chose a degree last
year. She said, “these classes I’ve been taking I kind of like.” So, she's finally, she's finally found her way.

It's a constant thing that we talk about. And knowing, I just, I know so many people that have switched majors. I think everyone in college knows some people that have changed courses so many times and degrees. My older brother is one of them too. The smartest kid you'll ever know. Physics and chemistry, was going into education and was like ah no I don't want to do this anymore. Fiddled around with a couple of other majors. Then dropped out, now he's joined the Navy, going to be like a nuclear engineer with the Navy. So like, it's like that's his new path. But, everyone talks about it.

During the focus groups with the recent major switchers (and the graduating seniors that had changed their major at some point), there were nuanced reasons given for switching majors that were different depending on the student’s situation. However, the vast majority of switches could be grouped into three broad categories. The first is that students discovered new majors that they had not previously known about or learned new or updated information about a major that made them view it differently. A good example of this phenomenon were the several students that switched majors from something to visual communications technology (VCT for short). This major is an amalgamation of aspects from graphic design, communications, web development, and digital media. It provides a combination of interesting coursework, marketable skills, and positive job outlook that makes it good fit for a variety of students, once they discover that it exists. Because it is a newer bespoke major that may not have the best name recognition, it is often overlooked initially by students. Students often learn about this major through peers, which doesn’t happen until students are on campus and may have potentially already declared a major. A few students also pointed out that a major requires students to travel to another campus 25 miles away for classes during junior and senior year. The students reported that knew of some peers that were in this major and then switched out of it when they found out about this requirement. These are the type of major switches that are probably avoidable. Majors that may prove popular with students once they are on campus but lack traditional name recognition could benefit from some better marketing and students could do a better job finding out about the particulars of a degree program before they commit to it. Poor information is an area that can be improved through interventions and advising and the earlier the students can get the improved information, the better.

The second primary reason for a major switch is self-discovery that leads to changes in values or interests. As has been discussed in this chapter, there is a large adjustment from high school to college and the typical student meets new kinds of people, has new experiences, and generally grows as a person while attending college. Often times, the student will become interested in a new subject after taking a course or changed their personal weighting on the factors they use to make major decisions. For instance, students may become more or less focused on the career outcomes associated with different majors, like pay. These types of major changes can’t really be legislated for. It is almost impossible to know how, why, or which
students will change their tastes and preferences over time. As shown in the quantitative examination, often times major switches don’t have to cost a student additional time to degree if the major is made early enough in their time in college. Since these types of personal changes are probably always going to be a part of the college experience (as they should), it is probably best to make sure students get a range of experiences early in college to try and foster this personal growth earlier rather than later.

The ability to do the coursework at a high enough level is the third prime factor that spurs a major change, as keeping a major that is too challenging can threaten a student’s ability to graduate or hurt their ability to meet minimum GPA requirements for scholarship. This student’s experiences are not uncommon, particularly for those that pursue academically challenging STEM majors such as these:

I really enjoyed my chemistry class, because my teacher was awesome, and so, I liked that. And, I got to college, and I thought that I was like, well maybe I'll try chemistry … But, I took two semesters of that, and apparently, all of the stuff that you take in high school is not what you take in college. And, there's a lot more that they don't teach you.

So, it got more complex, and I was very naïve, and it was too difficult for me. So I was like, there is no way that I'm going to major in this. And then, my dad and both of my older sisters are like computer science majors, slash they all work in the computer industry. So, I thought, well maybe I also have the same brain for that. So, I started taking computer science classes. And, it turns out that I do not have the brain for that either. So, I couldn't do that either. So, I'm like, well, I don't really know what else to do. So, I just ... Out of curiosity, I took an intro geology class, and I was like, this is really awesome and I did well. And then I went on a summer class trip to the Galapagos Islands, and that sort of really sold it for me.

Major changes are sometimes discussed as something bad and many of the deciding students spoke about that it was important to them to make a good choice the first time and not switch majors. Nevertheless, many of the major changes associated with poor academic performance are probably considered “good” changes, as these switches potentially raise the probability of graduation. As we saw in the quantitative results described in an earlier chapter, students that change their major one time do have a higher probability of graduation even than those that don’t change at all. This is potentially the mechanism through which that association works.

Despite the fact that major changes due to poor academic performance potentially raise the probability of graduation, there are likely activities that could be undertaken to mitigate the effect of these changes or head them off completely. To mitigate the effect of the change, students could be encouraged to try the major that will likely be the most challenging first. This would leave more time for students to complete course sequences in a new major if they are forced to change. One potential solution, as well, could be to compare the academic preparation of the student choosing a difficult major to the academic background of students that have been successful academically in this major in the past. These types of predictive analytics could
provide students a better picture of what majors might be challenging for them prior to their choice. However, providing this type of information could be discouraging students from even trying difficult majors that closely fit their interests. With the limited cost of major switching early in a college career, it might be better to just ensure students test the academic abilities early on rather avoid the major completely.

**Serial Major Switching**

Most students that switch majors only switch one time, although switching multiple times is not particularly rare. According to the national data analysis from the prior chapter, about 25 percent of major switchers changed their major more than once. Other reports have but the multiple major switching rate much higher than this. As the quantitative results show, multiple major changes are associated with a reduced probability of graduation and a longer time to degree for those that do graduate. A few of the major switchers and the graduating seniors had changed their major more than once and most had to extend their projected time to degree by a semester or more beyond their original four-year timeline. Nevertheless, it is truly rare for someone to switch their major six times and still graduate. Luckily, one of the graduating seniors that participated in a focus group was a quintessential example of an extreme major switcher. This student came into college trying to keep his options for a major open for as long as possible and had to work very hard to do so, as reported here:

> I knew coming into college that I wasn't going to graduate in four years. I started with that off the table. When I would pick courses and stuff I would make sure it would apply to at least two different majors that I was thinking about. I've always taken at least 18 credit hours a semester, or more. So, I've always kept it where it was like I'm diversifying my different majors. I was always staying up to where I wouldn't be behind credit hour-wise. I will graduate with well over 200 credit hours.

Noting that most bachelor’s degree programs require 120-125 credits, this student took excess credit taking to an extreme. In some ways, cramming 200+ credits into 12 semesters is an impressive accomplishment. These credits were not taken in a haphazard manner either. The student was incredibly well-versed in the degree requirements and course sequences of a wide variety of majors and had essentially taken courses as if he was pursuing several majors at once. He finally declared the major that he will graduate with (pending any last-minute changes of heart) after he had been enrolled for five years and it only took him a year to graduate after declaration due to his prior strategic course taking. He reported that he had about five different majors that he could have declared at that point and still graduate in a year. Despite his success in finally committing and graduating, this was a very costly way to keep your options open, both in terms of the additional semesters of tuition and the two full years of opportunity cost not earning in the labor market. The length that students will go to avoid commitment to a major know few bounds, but normally these bounds are financial. This student was lucky to have the financial flexibility to take this circuitous path and still leave with a degree. Many other multiple
switchers end up having to drop out and enter the labor force prior to graduation, as evidenced by the quantitative results discussed earlier.

**Biggest Challenges**

Deciding students reported many challenges with selecting a major and their decision-making process throughout the interviews. This section will discuss the issues that most hindered the major decision making students and will review their responses to a direct inquiry in their first interview about the biggest challenge that they have faced when it comes to deciding what to major in.

**Adjustment to College Life**

A prominent challenging issue for deciding students was trying to decide a major while simultaneously coming to terms with college life. The first interviews with deciding students took place part way through the students’ first semester on campus and, for most of them, it was the first time that they had lived away from their parents and family. One students said, “My biggest challenge was probably not having someone I'm super close with to talk it through with. I've used to talking with my best friend or my mom or somebody else in my family. So, they're all pretty far away. So, I don't get to talk to them much about it.” This distance can be isolating to a student and take away to some degree an emotional support system that has existed for a student’s entire life. As evidenced by the earlier discussion regarding external influencers, it can also minimize the advice and information shared by parents and peers from home about academic major options. Obviously, these relationships are not completely cut off as low or no cost communication methods abound. However, students report that communications become less frequent with parents and others not campus once they leave to come to college.

It is not just the reduction in communication with those back home that is part of the adjustment to college life. Many parents play a large role in the lives of their children, generally managing their affairs, keeping their schedules, and often making sure that they fulfill their obligations. Depending on the student’s level of autonomy prior to college, losing this family support can be a shock to the system, like it was for this student:

> College is a huge transition personally. And you just have to figure out what works for you personally and try not to push yourself too hard because it does get stressful at times. And just try to remind yourself that it's okay. Just try to calm yourself down. Enjoy the experiences, hanging out experience and all that stuff. Not just homework. And that's not fun because homework is not fun in general.

Dealing with the stress of just managing your entire life for the first time can crowd out the mental space necessary to properly consider what subject you want to major, like it did for this student:
I couldn’t stay on top of myself with making a decision, because I would get so much stuff piled on me at once, and then I would forget about it, and then we'll go to class, and they'll be like, "Deadline's coming up soon. You need to make your decision", and I would just kind of freak myself out.

A few of the deciding students had taken a year off between high school and college and lived elsewhere away from their families. These students explicitly stated that they thought that this was advantageous because they already knew how to live on their own and this gave them more time to concentrate on schoolwork and figure out what to major in.

During the 2nd interview, deciding students had another chance to look back on their entire first year on campus and it was obvious that more students had some challenges in this area. When you don’t have enough money to feed yourself, like this student, choosing your major begins to seem not quite so important:

Last school year I was broke. I didn't eat for a couple days or so. So, I was like, alright I understand college you don't eat sometimes because you're busy with stuff. So, I understand that, but this summer I made it to a point to make a lot of money ... or at least as much money as I could. You know hang out with friends, be a kid, have a good summer, but don't put yourself in the predicament that you were last year. I just did that, put that into perspective, worked my three jobs. So, I went from my retail job straight to coaching, and then after coaching I went to go work out and then I went straight to my construction job. It's not an easy thing, but my dad instilled into me when I was younger just the only way to be successful in life is to work hard, and the only way to be known and to be known as a good worker is just to work hard. So, I kind of just did that.

Personal Reflection

Many deciding students reported being challenged by the degree of personal reflection necessary to figure out one’s interests, values, and desires for the future. It was a common point of discussion for deciding students to speak about how their lives were generally planned out for them up until the end of high school. They had to pick a few electives or what sports they liked the best in high school. Picking a college to attend was somewhat difficult for some (but often eased by friends going there or geographic proximity), but many said that they hadn’t been required to be self-reflective to the degree required of them to facilitate a major choice. The sentiment from this deciding student was indicative of position of several students:

My major challenge would be definitely finding myself. Because people pick up new interests. I know with me, I kind of pick up interests, but I'm real big on, "oh, I don't like that." So, I'm real picky. So, I was like, "um, this might be the hardest thing for me to do, is picking a major." But then, when I sat myself down, and I was like, "dude it's not that hard, look at what you like."

This difficulty with self-reflection went beyond mere interests and extended in personal values. One deciding student reported that their biggest challenge was “probably the decision on which is more important to me, money or happiness.” When the decision on what major in is put in such stark terms, it is no wonder that students find this to be a sizable obstacle. A false
dichotomy between money and happiness or career and family was often discussed, but these are decisions that in reality are ongoing throughout one’s life and have a great deal of nuance in practice. This is another example of a deciding student’s linear thinking that links major choice to a lifetime career in a certain job and field. Rarely was the option to reconsider one’s career choice later in life mentioned in these interviews.

Uncertainty About the Future

Many deciding students reported that the hardest thing for them about deciding a major was their uncertainty about the future, both in their future interests and the future labor market landscape. Many students reported a sentiment similar to this one:

I'm pretty indecisive. Sometimes I wish somebody would say go and do this. This is what you need to do. Go. But I'm really worried about being happy with my career choice, so it's kind of hard to know. You go through all the classes and stuff, but even what I choose may not even be what I want to do for the rest of my life. My family is a good example of that. My cousin went to school, became a Latin teacher, and now he's an EMT. It's totally different. Then I can't decide if I would be okay with that or if that would really freak me out.

While this student is unsure about the future, they at least have the realization that a degree in one subject does mean that you will still in a related career for your entire life, an insight that is surprisingly lacking in the deciding student population that was interviewed.

Overcoming Fear of Commitment

The difference between this category and the previous category “uncertainty about the future” is a subtle one. Responses that were coded into “uncertainty about the future” had more to do with external circumstances changing (job market, for instance) or changing future career interests. This category was reserved for deciding students that reported that their biggest challenge was simply overcoming fear of commitment. These students had a pretty good idea of what they wanted to do, but can’t quite get themselves to declare, like this student:

I don't know I get really stressed out sometimes, that I'm making the right choice. I don't want to mess up my life. Pick the wrong job, then hating it or something, I don't know. So, that's been kind of stressful. And making sure I pick the right major and the right classes, and get the right grades. My grades are awesome right now, though.

They may have dipped a toe into the cold pool, but they were afraid of just jumping in and getting used to water. There is good reason for this, as there can potentially be large consequences for making a poor choice. This student is concerned about extending time to degree and racking up more debt: “It's a really big decision. I don't want to screw up the rest of my life. I also don't want to get through the first three years and then decide, "No I don't want to do this anymore," and start over. I'm already really in debt.” Students are well aware of the high propensity to change majors and believe that these changes may lead to additional time to
degree. All major changes do not lead to extensions to time to degree, which students may not consider in their mental calculations. However, changing your major at the end of your third year, as this student described, would almost certainly lead to some extension to time to degree unless the second major was closely related to the first.

Major switchers reported fear of commitment being a major challenge as well, even though by definition they had already committed to a major at least one time. This major switcher exemplified the idea that it takes commitment to switch as well:

You can have all the information; you can talk to everyone - students, faculty, academic advisors, but ultimately it comes down to like are you willing to make that change? I think that's the biggest thing. I think sometimes we get so caught up in planning our future and our life that we forget to actually live it. So, I think the biggest obstacle for myself is kind of just making that choice, saying, okay, you know what? I'm going to do it. I have the data. Now make the decision.

Additional Information or Resources

Deciding students were specifically asked an open-ended question at the end of their first interview if there was any additional information or resources that they could draw upon to help them make their major decision. The most striking feature of the responses to this inquiry was that fewer than 20 of the 49 students interviewed had an answer to this question. The remaining deciding students said something along the lines of “I can’t think of anything” or “No, I have everything I need. I just need to decide.”

Job Shadowing Opportunities/Speaking with Professionals in Field of Interest

Of those deciding students that did express a desire for additional information resources, it was almost unanimously stated that the students were looking for opportunities to get into the workplace and see how things work firsthand. One student lamented missing out one such program at her high school:

My high school started this internships program now. They can go to like any place that they could possibly want to major in and job shadow them. Of course, they started that the year after I graduated. I wish that would have been more of a thing when I was there. I feel like when you're at the senior year, I feel like they should offer that to everyone. I feel like it helps us understand better and you get to see what someone does on a daily basis.

A few other students were not as interested in seeing the day-to-day activities in a job shadow type of situation, but were still looking to get more opportunities to speak to working professionals in career areas that correspond to academic fields under consideration:

I think the only thing I want to do is just get in front of more people and have them tell me how they started their process. So, I want to talk to more people and just ask them, "so where was your start, where was your ground level at, and how'd you work up from here?" Because right now, essentially, I am at that
ground level. So, I'm at the beginning stages. So, I want to know, maybe, "who are the people that you talked to, to get into the position you're at?" Or, "was it easy? How long were you unemployed with your major, before you were able to get this job opportunity?" So, basically, I just want to talk to some more people face-to-face.

These requests go to show that many students are missing information about potential careers that is crucial to them feeling comfortable with choosing an area in that major. Since it is so common for these students to think that they are deciding on a lifelong career along with their major, it is easy to see why so many of them want to get into the workplace, get a taste of experience, and ask some questions prior to making a major declaration. Just like many students don’t feel comfortable about declaring a major in an area without first taking a class, many deciding students don’t want to pick a career with no or limited knowledge of what it is like to do the job on a day-to-day basis and an understanding of the path for advancement in the field.

These same thoughts were echoed by the major switchers and the graduating seniors. Many of them talked about missing the link between the classroom and what goes on in the labor market for graduates with that major, exemplified by this student:

I think something that institutions will need to do is really push the idea of having internships and having co-ops, and having experiential learning opportunities to give students the opportunity to figure out what it is they like and what it is they don't like. And if they enjoy a certain experience, then build on that. Try something a little bit different. Or continue and grow in that area. But if you're going to push that you need to graduate and you need to get a job, at least let them like what they're doing.

**Better Information Earlier**

A few major switching students and graduating seniors spoke about wishing they could have received help starting their major consideration process earlier, including this student:

I would like more integration in high school about how to prepare for choosing something for college, because not everybody has a main interest that they think that they would like to do in college. So, maybe trying to narrow it down. Or even if they do change it later, that they know that they are able to do that. Or even just knowing that there is such a broad variety of things that you can do, and then knowing what all of them mean, because even looking at a list of all the majors, I'm like, "What the hell do all of these mean?"

As shown earlier, most students are starting their major consideration process in the 2nd half of high school and this would seem to be a prime time to provide students with the information suggested by this student, including ways to narrow down interests and information on the breadth of options available to students to help students generate an inclusive choice set.
Advice for Incoming Major Deciding Freshmen

At the end of the follow-up interview, which took place during the summer between their first and second years, the deciding students were asked if they had any advice that they would like to communicate to incoming freshmen. Now that they were battle-hardened sophomores with a year of college under their belts, most did not hesitate to impart some wisdom on their uninformed counterparts getting ready to embark on their collegiate journey. Here is a selection of some of the best advice that also exemplifies the advice given by deciding students that is not included here:

Do what you want to do, not what your parents want you to do.

I would say, it's not a bad thing to go in undecided. But knowing what you want to do is, I think, more important than people realize, when choosing a school. Make sure that you have a couple majors you're interested in and see if they're even offered at your school. Choosing this university, I knew that they had the majors that I was interested in, but I had no idea that one of the majors had most of the classes on a different campus.

My advice is definitely to just relax. If you don't have something picked out, don't freak out. Because I do that to myself, I tweak myself out sometimes. Realize you're still young. There's a huge ... I don't remember the percentage, but there's a great percentage of people that go to college for something that they end up not even doing for the rest of their life, and that's okay. Down the line, you'll find what makes you happy and you'll find what you're passionate about, you know? As of now, I feel that way about my major, but who knows? That could change in the next 10 years of my life, you know? And I'm open for change, so. That's what I would say.

You'll eventually get there, it's just takes time and you got to push yourself to figure it out, because you can't ... your mom or your dad is not going to help you, so that's your path to figure out and if you believe that's the direction to go, you should go for it and don't be afraid.

Towards their major choice, you can get caught up with the, "I'm on my own, I have more freedom". Yeah, you have more freedom, but with that freedom comes with more responsibility. Somebody's not holding you accountable as they were in high school, they don't hold your hand as much. I mean yeah, granted the first year they kind of hold your hand to get you used to college, but you still have to have accountability towards yourself to work hard and work hard at your major and what you want to do. You kind of have to think more big picture than little picture.
I would say don't rush, don't make an impulse decision. I mean, do I wish I could've take some major classes a little bit earlier? Yeah, but I'm happy I didn't go a different route and waste my time. So, I would say don't jump into something, don't feel pressure like you have to jump into something. The university does a great job, advising is great. So, they'll help you out and make sure you're not wasting time, wasting credit hours. I think that's important. And then, obviously just work hard. I think that's the other thing I would say. Maybe you don't have a goal in sight, but you still have to get a good GPA because, no matter what you do, that stuff matters.

I would suggest that they aren't afraid to speak up for what they feel like they might enjoy, no matter how diverse their interests are, and to contact as many people and just to create good relations with people all across the university. Everyone there at the university is there to help. Just to really access their resources.

Look around more, and just take it on your own hands to go job shadow and ... I think job shadowing is definitely my number one thing that helped me the most. Because people can tell you all these different things of what you should do, or what it's like to be that, but you're not going to know unless you really go figure it out for yourself. And I worked with a bunch of different job coaches, and they were great. I think depending on the college, definitely. But definitely just job shadowing and going to try and experience it for yourself, I think, is the number one thing to do, for sure. Experience it before you go and decide.

These deciding students have obviously learned a lot over their first year in college and have done an excellent job summing up some of the top issues that have come out of this work. Major deciding students must realize that they now have an increased level of personal responsibility and a reduced or at least revamped support structure. However, at most universities, the resources that they need are there for them, but they need to develop the motivation to use those tools. Lastly, students need to relax and have fun. For most students, starting college without a declared major won’t delay graduation, with a few exceptions, if they declare by the start of their sophomore year, assuming the student takes a full credit load and has adequate academic performance.

Conclusion

The analysis has taken a close examination of student major choice at one university from many different angles. It includes a longitudinal description of the initial major selection process of 49 students that did not declare a major prior to beginning college. It has also added the perspectives of students that had recently switched their major and that of seniors preparing to
graduate and enter the labor market (many of whom were major switchers themselves). While this work is set in the backdrop of the particular structure and policies of one university, the overriding themes are surely present in college students making their major decisions all over the United States. After covering what factors students use to make their decision, what sources of information they use, which external influences are most powerful, and what additional resources they desire, among many other things, there are several important takeaways that are important to summarize here.

**Summarized Findings**

- It appears that all students, whether they entered college undecided or not, have some degree of uncertainty when it comes to what field to major in.
  - The interviewed deciding students reported that major selection is a major topic of conversation and those that have declared are in practice just as undecided as the undecided students.
  - This notion is backed up by the high rate of major switching seen in those that entered college with a declared major.
  - This suggests that any interventions and extra programs for undecided students, like more intensive advising and, in the case of the university studied in this dissertation, a career and life planning course, could be prove useful if they were extended to all freshmen students.

- Students often have poor information about the majors that they are considering.
  - They are sometimes unaware of the nature of the coursework, the academic rigor needed to complete some majors, the possibility of double majoring, and course sequences and degree requirements, particularly deciding students in their first semester.
  - Deciding students also are not well-informed about the pay levels in careers associated with different major choices, although most do a passable job relatively ranking majors under consideration by pay.
  - Students are also uninformed about the range of majors offered by the university. It was common for a major switcher to remark upon the fact they had never heard of their major until one of their friends told them about it and how they wish they would have known about it sooner.
  - These are information problems that can be mitigated by sharing the right content using the right method to the right people. Deciding students reported frequently turning to YouTube videos for information on majors and careers. Universities could take advantage of this dynamic content delivery method to get information on majors and program requirements to students in a form that they are more likely to digest. Perhaps they could even provide some practical experience to students by including them in the production of content.
• The ability to do the coursework is also a very important factor and one that grows in stature as students advance in their college careers.
  o For initial major selection, this often manifested itself in the avoidance of majors that had higher math requirements, despite keen interest in the subject matter of the major. The idea of having to pass a calculus class with a C or better, often preceded by a long math course sequence depending on high school preparation, was enough to keep many deciding students from pursuing majors.
  o For major switchers, poor academic performance in major-specific courses is a leading cause of switching.

• Real life experience in a field is incredibly important for a student and helps them making up their mind in one way or another.
  o This could take the form of a classroom placement in an introduction to education class, a studio for an architecture major, a job shadow of an accountant, or a field experience for a geology major. These types of experiences proved to really help decide to declare a major or to eliminate a major from their choice set.
  o Some majors, like K-12 education, provide a field experience in the very first class, but other majors don’t have any practical components at all. Students that were considering becoming a teacher were very decisive about pursuing teaching or not after the initial classroom experience.
  o It takes a lot of effort to form the partnerships and infrastructure necessary to provide practical experience at that scale, but this early provision of practical experience, even something as simple as a short job shadow, would help improve the quality and speed of major selections.
Chapter Five: Academic Advisor Perspectives on Major Choice

Overview

This section of the dissertation will describe the analysis and findings from semi-structured interviews conducted with academic advisor whom advise students making decisions regarding their academic majors. I interviewed 21 advisors at the same Ohio public university as the previous sections from different academic colleges, the major-deciding student program, and selected specialty advisors. All of the academic colleges at the university were represented by at least one advisor as well as advisor representatives from the honors college, a program for low-income first-generation students, and intercollegiate athletics. The interviews were conducted in person and took place during February and March 2017. This chapter discuss the advisors’ experience in advising major deciding and switching students and their perspectives on policies and procedures that affect their choices.

Methodology

Semi-structured interviews were conducted with academic advisors that play a role in the major selection process. I planned to conduct interviews with all of the academic advisors in the office of pre-major advising that specifically deal with deciding students and at least one advisor from each of the six academic area colleges at the university. Each interview was designed to take a maximum of one hour and participants did not receive a tangible incentive for participation. All eight academic advisors in the deciding students advising office were recruited via publicly available email addresses and all agreed to participate. I contacted 11 college specific advisors via publicly available email addresses and 10 agreed to participate. This sample did include at least one member of the advising staff from each academic college.

During the interviews, it emerged that additional advisors in a few specialty programs on campus (intercollegiate athletics, honors college, and a program for first-generation low-income students) were thought to potentially advise students on major selections. One member of each of these three departments were contacted via publicly available email addresses and all three agreed to participate. All in all, 21 academic advisors were interviewed in late February or early March 2017. These interviews took place in person in the participant’s office.

The interview protocol asked the advisors what kind of assistance they provide to major choosing students, what factors they see as being primary drivers of major choices, and what additional resources (if any) would be helpful to them. I also asked about the frequency of advising students making a major choice beyond their first one, differences between initial choosers and major switchers, and differences between different groups of students like first generation college students. The protocol can be seen in full in Appendix A.
Responsibilities and Student Load

Helping students make decisions on their academic majors, whether it be an initial decision or a major switch, is a primary part of the duties of an academic advisor. College specific and pre-major advisors technically execute major declarations and changes in the internal university systems. They also provide information and counsel regarding the range of majors available and the details regarding each individual degree program. The frequency with which advisors interact with their assigned students varies from weekly (in the case of intercollegiate athletics) to never (upper class students are not required to see an academic advisor, but most are assigned faculty advisors at that point). However, most students interact with their advisor in person once a semester around class scheduling time. Some of these visits, such as those for all undecided students, are required each semester. Students are also required to visit their academic advisor and get a signature on a form in order to formally change a major. Some students heavily communicate with their advisors via email and additional in-person visits, while others will only meet with their advisor as required. The latter is certainly more common.

The student load (meaning how many students each academic advisor is responsible for advising) varies widely among the advisors, depending on their role. At the high end, one advisor has 700 College Credit Plus students, who are high school and middle school students participating in a dual credit program. On the low end, there are graduate assistant advisors and advisors that share departmental administrative duties that have a load of fewer than 50 students. Most full-time college specific advisors have between 400 and 600 students. Most full-time pre-major advisors are responsible for about 200 to 300 students.

Assistance with Initial Major Selection

A large majority of the advisors interviewed had dealt with students who were in the process of making their initial major decision. By definition, the pre-major advisors specialized in dealing with this type of student. Even most college specific advisors have dealt with students making their first decision on a major. This is due to students being able to declare a college and remain undecided in that particular college. For example, a student can apply to and be accepted in to the college of business but wait to declare a particular specialty in the business, like accounting or marketing.

I asked all of the advisors that reported that they deal with students making their initial major how they approach their first appointment with an undecided student and how that initial appointment goes. One advisor believes that it is important to get the students thinking with a positive mindset followed by a little practicality:

I think making the students know that being undecided is a choice [is important]. That's really powerful, to make sure that they know that they did make a choice.
Their choice is to be undecided and I'm really big on making sure that's a positive message. I think, sometimes, support systems and other systems lead them to think that's a negative thing and it's like, "No, this is okay. You're doing okay. You're okay,". I think the other thing is looking for ... What's in the running and what is your skill set? So, if you're telling me that you really want to go into the nursing profession, but, yet, blood make makes you pass out, we have to make sure that these two things are in alignment and along with that comes in that career piece. I'm very big on ... If you can't tell me what you think you might like to do, tell me the things you don't want to do.

Another advisor highlighted the importance of helping the deciding students have a feeling of making progress by introducing concrete steps into the process:

I show them all the majors we have here and I'm like, start even crossing out things that don't sound good to you, just knowing you don't want to do this. Just to try and give them some control that they feel like they're making progress. Another thing I'll do to help them feel a little more in control is I give them some homework assignments, because often with tasks it makes them feel they're making headway. Especially if they're truly not sure. A lot of times I'll give them homework and then maybe have them meet with me in a couple weeks to see where they've come in their homework. That could be, we have a great referral in our career center, [name omitted]. To see her, there's an online, free, interest inventory that they could even do in their pajamas and fuzzy slippers, and that helps them feel a little bit more comfortable and get started on that process.

Both of these advisors, along with several others, highlighted the importance of having initial major deciders identify what majors they don't want as a first activity. In other words, they are highlighting the importance of students creating a reduced choice set of potential majors. This allows students to focus their information gathering on a few more likely options rather than being intimidated by the long list of majors.

However, one advisor likes to start with what the student is good at and what they enjoy: “We talk about what they're doing now that they enjoy. Normally, we focus on the things that they are good at. If they really love the psych class or the sociology class, we talk about what they like about that class. Then, their values and morals and goals, and how that class can play into that. So, what things about that do they like? Is it the teaching style? Is it the content?” This advisor tries to identify strengths and subject matter interests of the students and then match them up with the delivery method of the content that the student might like. An advisor is adding a lot of value here beyond what a student can likely do her or himself. It is unlikely that a new student choosing their initial major will have much knowledge of the subject matter of a major, let alone the deeper knowledge about the specific courses and professors that the advisor can provide through their experience and relationships.

Another advisor takes a similar approach by trying to develop students’ ability to be self-reflective in her initial interaction with a deciding student:

Typically, it's a lot of questions. I ask a lot of open-ended questions because I really want ... I feel oftentimes that students have a lot of opinions thrown at them all the time, and I don't think they have enough people listening to them. I
don't think that they are necessarily taught to listen to themselves … I try to understand where students are coming from, what their experiences have been, what their interests, what their values, what their skills are, and obviously, that's not all in one sitting, but I ask a number of questions to try and start to get them to think down that path.

This advisor also touches on the idea that it is important to provide a venue for active listening, as students often don’t seem to have that. I left my interviews with deciding students (as described in the previous chapter) with a very similar feeling – students don’t often get the chance to share their feelings about the major selection process with a “neutral” figure in their lives. I think that most advisors would like to fulfill this role for their students, but it was reported that high student loads often precluded the advisors’ ability to spend the necessary time with each student.

Information Used for Advisement

Advisors draw upon a range of information sources to help them advise students making their major decision. For the initial meeting, advisors have a “face sheet” that includes information about a student’s academic preparation in high school and ACT scores, which advisors heavily rely on to help place students in the appropriate required writing course and the correct place to begin the math course sequence. Beyond these initial placement decision, advisors did not often utilize information on a student’s high school background. Advisors also draw upon a compendium of “check sheets” that list the degree requirements for each major. They can also access a degree audit report, that will list remaining outstanding credits and requirements. This report can be run for any major under consideration and is also available to students via their student portal. Nearly every advisor also mentioned that they use the student interest profile resulting from the FOCUS self-assessment that all deciding students take as part of their required career and life planning course. This assessment is also highly recommended by advisors who see students that are making their major decisions, but did not take the required career and life planning course.

There is also an internal student information system where Advisors can make notes that can be seen by other advisors. This was reported to be of great help when a student is transferred to a new advisor due to a major declaration or when a student visits an advisor whom is not their assigned advisor. This latter activity normally takes the form of a major-deciding student seeking additional information on a major of interest from a college-specific advisor. This is also useful for students with multiple advisors, like those in the honors college.

What Factors Should Students Use to Weigh Different Majors

In the previous chapter, I discussed the factors that major deciding students used to rank and evaluate their potential major choices. In this section, I will discuss the responses from academic
advisors when asked about what factors they feel students should use to evaluate majors. One advisor thinks it is important for a student to match his or her ability to academic requirements for the majors under consideration and also to think about their interests:

I think ability is one, and then also interests, also with us for that, they've come out of being in school for 12 years, so what do they know? Teachers, they're with teachers all day. So, they're like, what do you want to do? Well, I want to teach. So, I think sometimes coming to college really having their world opened up, you really have to ask "do you really have this interest?" And maybe not, and that's okay.

This idea that students sometimes confuse familiarity with interest in a field brought up by this advisor was something that was mentioned by a few other advisors. From the interviews with major deciding students, it seemed as many students were anchored on potential major choices that were related to parent’s careers, probably a consequence of the student having better information on majors in the area. Another advisor remarked that it was effective to get students thinking more about their career:

Typically, I just ask them [deciding students] what sort of things they're thinking about career-wise because a lot of times they're just very major focused. Like, "I don't know what I want to major in." Well, what are some things that you picture yourself doing? What does a day-to-day job look like for you? Sometimes they can't answer it, sometimes they can. Usually ask a little about their interests like the things that they enjoy doing. A lot of times it's really focusing on what classes to take for the next semester.

This advisor has caught on that this factor is very important to students (as reported in the previous chapter) and is encouraging students to start considering the career implications of their major choice early in their process. However, it didn’t seem that students need much encouraging to conflate major choice with a choice of career. In fact, some advisors advocate a different approach and think students should elevate the academic aspects of a major choice over specific career preparation.

I tend to go with the coursework [as a key factor, compared to career concerns]. I think that I'm a huge believer in liberal arts in general, and in how liberal education can really prepare you for any type of work. And in knowing that, thinking about business, yes, these courses are going to be super helpful for what you're doing in real life. But what are you going to get from the general education classes? What are you going to get from some of these courses that aren't related to your career? So, find something that you are going to enjoy a majority of the courses, and I think that just makes life a heck of a lot easier.

Another advisor said “I'll show a student a check sheet sometimes. And say, ‘Okay, do these courses look interesting to you?’ I'll say to students, ‘call me an idealist’, but I really want a student to have a major and be able to study something they enjoy learning about.” There is definitely a tension that exists between a more liberal arts viewpoint and those that view college as specific preparation for a career, which is certainly not unique to academic advisors or this university. This manifests itself via as a potentially inconsistent approach on how different
advisors, even within the same college, speak to major decision makers about their choices. At this university, this differential approach seems to be likely to exist in the college-specific advisors. The approach of the pre-major advisors seems to more uniformly favor career-related factors.

Special Considerations for Intercollegiate Athletes

As a college athlete once said in a famous National Collegiate Athletic Association (NCAA) commercial, “There are over 380,000 NCAA ‘student-athletes’, and most of us will go pro in something other than sports.”16 While it is nice to think about intercollegiate athletes as just another student on campus and make major decisions in the same way (which they do for the most part)17, athletes do have to take some special factors into account that can sometime restrict their potential choices, particularly for transfer students from another four-year university or community college. The key additional requirements for major deciding or switching athletes are whether they can fulfill all of their program requirements along with the time commitment necessary for the sport as well as being able to meet NCAA “progress toward degree” requirements to maintain athletic eligibility to participate in sporting contests.

For the first additional consideration, there are certain majors that athletes simply cannot choose if they want to fully meet their athletic obligations, mostly those that require a significant practical experience outside the classroom like nursing or education. An athletics advisor, speaking about health-related majors like nursing, shared that, “This isn't a unique problem here. It's a national issue and concern because a lot of those are either state requirements or national requirements for time in a classroom, and contact hours, and certain requirements that we have to do for those programs in order to get your certificate or diploma.”

The somewhat arcane NCAA “progress towards a degree” requirements are another issue that can limit athletes’ potential major choices and must be a factor in an athlete’s choice if he or she wants to maintain athletic eligibility. It is a fairly common practice for athletes to attend community college to showcase their athletic skills if they did not receive a scholarship from an NCAA Division I university directly out of high school or for an athlete to transfer between two four-year universities. An athletics advisor reported that meeting the progress towards a degree requirement can affect major choices

…particularly for transfer students who, because of where they attended or prior majors or if it was a junior college, or community college, they've probably taken care of all their general education credits but they're not in the loop in taking

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16 A quote from a long-time NCAA branding campaign beginning in March 2007. A press release describing the campaign can be found at this link as of March 19, 2018: http://fs.ncaa.org/Docs/PressArchive/2007/Announcements/NCAA%2BLaunches%2BLatest%2BPublic%2BService%2BAnnouncements%2BIntroduces%2BNew%2BStudent-Focused%2BWebsite.html

17 For full disclosure, I participated as a Division I NCAA athlete for one season.
major specific courses. It's going to set them back, so for a transfer student that's been at a community college for two years and has to be at 40% in a particular program [taken 40% of credits towards the degree] by the start of that next year [start of junior year]. A lot of programs that have few elective credit hours built into their program, you can't major in those. So, for sport management, there's room for five elective credit hours. There's no way, a lot of students are like, "I'm going to major in sport management". And I have to say “I'm sorry but you're too far behind, you will not be eligible [if you choose that major]”.

Noting that a sports management major is often of great interest to those who have dedicated a large portion of their lives to sports, this can be a great disappointment to these athletes and this structural problem exists for other majors as well. This same issue can affect athletes looking to change their majors, particularly later in their career. A student with junior or senior standing looking to switch their major often has to choose between being maintaining eligibility to participate in athletics (and potentially financial support from an athletics scholarship) or graduating with the degree that they want.

While there is certainly a downside to these restrictions on an intercollegiate athlete’s choice, they receive a level of support (not even considering the financial support of an athletics scholarship) that is unparalleled in the general student population. Freshmen and at-risk students (mostly those with lower GPAs) see their advisor weekly, where advisors typically talk about the student’s academics, even down to the specific assignment level. Athletic advisors put on seminars about academics, study skills, and career skills for athletes and additional tutoring services are available. Outside of that, any student that wants to change their academic program, even down to dropping or adding a class, has to meet with their athletic advisors, largely to ensure that a student doesn’t accidentally threaten her or his eligibility for athletics:

If a student's considering dropping a class, adding a class, changing their major, it is required that they come talk to us because it could potentially impact their eligibility. Not to mention, their planned program and timeline to graduate but there is a lot of certain regulations in the NCAA of the amount of degree applicable credits you have to take each term, each year. How many before the start of your third year, your fourth year, your fifth year. So, there's all these different benchmarks.

As many states move to a performance-based higher education where raising four and six-year graduation rates will be a priority to increase institutional funding, it will be interesting to see if universities adopt some of these very intensive advising activities that are in place at athletic departments at universities across the country. Universities as whole under those types of funding regimes will face a similar incentive as athletic departments currently do to ensure that students are making progress towards a degree in a timely manner. A cost-benefit analysis looking at the potential graduation rate improving effects of an intensive “athletics” advising approach and the additional funding attached to it versus the cost of implementing such a program would be interesting.
Biggest Challenges for Initial Major Decision Advisement

The advisement of major deciding students is a difficult endeavor. This section will detail the biggest challenges faced by academic advisors when trying to guide students in the major decision making process.

**High School to College and Adolescence to Adulthood Transition**

As one advisor put it about dealing with freshmen students, “you have to remember that, a few months ago, they had to raise their hand if they wanted to go to the bathroom.” Students are still dealing with the transition away from home and often struggling to take control of their lives that have been controlled by others for so long. One advisor said:

I think students need to trust themselves. I think honestly, what I have seen in my number of year of working with college students is they listen to so many other people's opinions frequently. And they don't trust themselves. And so, a lot of times I'll have a student sit down and say, well they're in their third year of the architecture program and they hate it. But, their dad was an architect and he wants me to be an architect. Or, their uncle was an architect. Or, whatever. And all their faculty have been telling them that they have the skills, and that they're just so, like, skilled in that area.

But they don't want to do that. That's not the work they want to do. And they said, well, and I ask them and a lot of them will tell me, "Well I knew my Freshman year that I didn't really enjoy Studio." But if you don't enjoy Studio, you're not going to enjoy the field of architecture.

Some students are just not ready to have a conversation about what they want to do with their lives because they are still struggling to provide their basic needs away from home. This story from an advisor sums this type of situation:

I was talking to a student about potential major choices and she was said, "Can we talk about something else?" I said “sure”. She was like, "My mother did everything for me. I'm spoiled," I go, "What do you mean by that?" And she was like, "I don't know how to do my laundry."

I was like, "Do you have clothes left today?" And she was like, "Barely."

Who was she going to ask? She's not going to ask one of her friends because it would be ... I think it would be very embarrassing. Not one of those things like, I take my laundry home every weekend because I don't want to do my laundry, but I literally don't know how to do it.

Other advisors talked about how they have to be on the lookout for situations where it seems like a student is distant and distracted. The kind of introspection that is needed to have a productive conversation about your academic future is just not going to be there if a student has other worries going through their mind. Advisors have to be cognizant of that and read when a student is in the right frame of mind to have these conversations or determine when it might be beneficial to refer a student to a counselor if it looks like they are really struggling to deal with their day-to-day responsibilities.
Dealing with Students’ Fear of Commitment

The fear of committing to a particular field was one of the biggest challenges reported by the students interviewed in the previous chapter. It is not surprising that dealing with this fear was a challenge reported by several advisors. One advisor, talking about students with a fear of commitment described how fearful students talk about their decision on a major:

It feels like a life-long “this is it” decision. This is forever and ever amen. I have to do this. And we talk about that in the [career and life planning] class that I teach. A lot about how many times people will change their careers and I think it's interesting when we probably look at their parent's generation. I mean, my parents have worked at the same jobs their entire life. I never knew people to switch jobs. I thought that that ... you do something and you do that forever. And I think many of them have seen that, probably, in their parents.

This kind of uncomfortable feeling that students have with thinking about their future and the perceived enormity of their decision can sometimes turn into full-blown anxiety. It is important to keep in mind that academic advisors are there to provide advice on a student’s academic pathway and that they are not, for the most part, counselors. Some advisors feel more comfortable addressing the emotional side of these decision in a more holistic manner, to the point of having tissues on the desk ready for tearful students. Other advisors want to stick to the academic side of things and quickly refer students to professional counselors. The good thing is, in both cases, professional counseling services are readily available to students who need them and advisors will not hesitate to refer students or help them contact a counselor to set up an appointment if needed. However, dealing with these situations, which are fairly common, is a big challenge for the advisors.

Tension Between Efficiency and Service to Students

Dealing with the aforementioned type of situation is also a challenge to advisors because they simply don’t have the time to deal with it. Advisors have large student loads. To serve each student properly, advisors need a bit of prep time before any student appointment and then follow up afterward. This follow up is increasing due to increased tracking requirements, but student loads are staying the same or growing for the most part. One advisor sums up this tension perfectly:

We're being asked to do a lot of things with tracking and technology and data, sometimes I feel like we lose sight of the fact of being in the moment with a student. Because we're so worried about pushing this button or doing this or answering this or, you know, documenting this that sometimes I just need to be with them.

And I think sometimes I wish the powers that be that are like, well "you need to do this and you need to talk about a grad plan." And I'm like, “come sit with me,” because sometimes I work with a student who doesn't even, can't even get out of bed that day. And I don't want to talk about six, seven months down the
road. Or if they're not sure what they want to do I don't want to stress them out like that.

So, I think there's a disconnect between what we're sometimes being able to do or need to do and wanting students to slot neatly and go on their track and graduate, and what the reality is. And I think sometimes we lose sight of that. We're trying to go more towards group advising, and I hate that. Because I, especially your first semester here, I want that relationship one-on-one with you, and you're not going to tell me in a group setting, "by the way, I don't want to be this major anymore."

**College Credit Plus**

Another challenge that was mentioned by several academic advisors was dealing with students that took part in Ohio’s College Credit Plus, a dual credit program that allows students to begin earning college credit as early as 7th grade. Part of the appeal of this program is that students do not pay for taking College Credit Plus courses, unless a student fails a course and the school asks for reimbursement of the money paid to the sponsoring college as part of the program. This program is marketed as a way for students to accrue college credits in high school and therefore require fewer semesters to graduate from college with a degree. This would save a student a substantial amount of tuition if the credits earned in the dual credit program were fully applicable to the degree program of choice, but this scenario is not the case for many students. This academic advisor describes a situation where students really require eight semesters to complete degree requirements, no matter how many credits were accrued in high school via College Credit Plus:

So, we're almost expecting that to take a certain sequencing courses in high school to benefit in college and to whittle down and pare down your major choices. Now, this is for education majors ... now, even though in human development and family studies, I have people come with a lot of CP credit and I can get them out a year early. But with our restrictive, prescriptive, sequential K-12 education programs [that culminate in licensure], that's difficult.

This can be a challenge dealing with students in initial advisement meetings and from parents (who will contact academic advisors directly\(^{18}\)) that expected the student to be able to graduate early. Financial planning for paying for a college degree will often include the plan to graduate early in these scenarios, so receiving the news that a student now will be required to stay for and pay for additional semesters beyond what was plan can come as a shock. Advisors expect these issues to become much more common, as the dual credit program is relatively new and the number of students with credit and the amount of credits they each have is increasing every year.

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\(^{18}\) As the vast majority of students are legal adults over the age of 18, advisors cannot discuss student performance and records with parents that contact advisors directly due to FERPA regulations. This does not stop some parents from trying to obtain these records and influence advisement anyway. In these cases, advisors will recommend that parents engage directly with the student, who, of course, is able to personally share whatever they choose.
Primary Factors Driving Major Switches

The vast majority of students that change their major are required to see an advisor prior to doing so. This gives academic advisors good visibility into the reasons that students give for switching their majors and the factors that students use in selecting a new major. This section will describe those reasons and factors.

Academic Performance

A student’s performance in the classroom is by far the most frequently mentioned reason for major switching. This leads to a rash of major switches right after grades come out, as described by this advisor:

> It's also interesting, the cyclical nature of major changes that happen after grades come out. That's another fun one. I think, for me, if I'm ranking top three [reasons for major switching], that's got to be one of the top ones. It may be even the number one. Beyond that, then it does become things, more about their self-interest, and their career paths. You know, that [academic performance] is right up there.

It can take some time for students to realize that they just can’t quite cut it academically in their major and this can be a very difficult thing to face for some students. It can mean the realization that the career that they have dreamed of since childhood is not going to happen. This advisor describes one such situation in detail:

> I actually had a student who was pre-med and she realized that her GPA just wasn't there. Came in crying and I just said, you know there are other avenues or ways that you can get to this goal and do what you want to do. She took that, absorbed it, thought about it, reflected, came back, has a different major and is going to graduate and is going to pursue graduate studies and go a different route. I empathize with them for sure. That's a tough conversation. Fortunately, she was one that was mature enough to come to that decision and not try to continue pursuing it. Other students who are nursing, if they can't cut it here, they're like, well, “I'll just transfer and go get my associates.”

Often times, it can be as little as a lower than expected grade in one major-specific class that will spur a student to consider a major change, like this student:

> I have a student right now who received a C in her first chemistry class in her first semester. She's a strong student and the conversation was, let's not take any science classes this semester. She's a chemistry major. It's like, “let me just take a break, I just need to see.” She took all social sciences and arts and humanities classes. Okay, let's see how it goes. Let's see how you feel, let's see what this can lead to for you.

There is significant pressure on many students to maintain a high GPA, whether it just be personal or parental pressure or more tangible sources, like GPA requirements to maintain scholarships or remain competitive for graduate school admissions. As students reveal information about their ability to perform academically to themselves through class taking, it is
only natural that actual performance does not match up to the expectation of performance that students had when they originally declared their major.

**Career Considerations**

Several advisors observed that they had advised students who switched majors after learning more about careers associated with their major choice, often after “real life” experience in the field. This is summed up well by this advisor, speaking about a requirement for students to do 3 co-ops or internships in a major that they advise:

> I think for us, it [co-op requirement] helps a little bit. We weed them out a little sooner because of that co-op experience. and so having them out in the field, we try to usually get them into that co-op their first summer, between freshman and sophomore year. If not then, then that second summer between sophomore and junior year. And so, having that hands-on experience in the industry, usually confirms to them that they love it or hate it.

Often time, career experiences do not live up to expectations or provide additional information that causes a student to change her or his major. Interestingly, this same experience has caused students to stop out because they didn’t want to wait until getting their degrees to begin their careers:

> Then I have some that just opt out. Some that love their co-op experiences so much that they made some different connections. That they are like “I don't need it” [a degree] and join the labor force. So, I have a couple of those. And then some of those will come back a couple of years later and say, I need the credential to move up.

This sense of discovery of the realities of certain careers is particularly frequent for education students. This is often seen after students take their very first education class, which has students do some field work, as described here:

> Yeah, there are about 30 hours in the field. It's a really tough class. It's a lot of paperwork, so we hear a lot of complaints about it. But, yeah there is a class, and we want you in the field from day one, just because of that. And, I tell my students, it's okay, that's part of the process. You might get in a kindergarten classroom, where you think, “oh my gosh, if I tie one more shoe, I'm going to choke myself.” And it's okay. It doesn't mean you don't want to teach and maybe you want to switch majors, and that's all alright.

**Change or Discovery of Tastes or Interests**

As students persist in college and gain more experience in the classroom and in life, their interests, tastes, and preferences can change over time. However, this type of slow discovery of a new interest was not often cited as a reason for a major change. Major switches due to interests were often the cause of quick major switches where there was mismatch between personal interest and the realities of studying a subject academically. It was often apparent after only a few sessions of a major-specific class that there was a gulf between student expectations of what
a subject was and what is actually learned while studying the subject. Advisors reported that these situations are often the cause of quick major switches for students that declared their major prior to starting college.

It can also be the case that students find majors that match an existing interest, but they simply didn’t know the major existed when they made their initial major declarations. One advisor, describing a lesser known major, said, “I think, for the students switching in they don't know about visual communications technology. They don't know what it is. And so, they hear about it word of mouth, it's not something that's very commonly known what it is.”

**Time to Degree Concerns**

Time to degree concerns are not often a factor in choosing to initiate a major switch, but they are a major factor in determining which major to switch in to. Students will often review degree plan audits with advisors prior to switching to ensure that the new major will allow completion within a timeline that is acceptable to the student. Concerns about time to degree is also a factor in the low rate of switching into some of the more lucrative STEM majors, as stated by this advisor:

> The pre-requisites would definitely hold a student back [from switching into a STEM major] because especially for chemistry or physics if you're not ... And computer science, if you're not really in those classes your first year, you could be here for a fifth or sixth year just because your sequence is behind unless you want to take summer classes. So, that could be a factor for our students because they obviously don't want to be here ... Well, some of them, don't want to be here for too long.

**Difference in Advisement between Initial Major Deciders and Major Switchers**

Advisors were asked whether they approached the advisement of major switchers any differently to how they would advise a student considering their initial major decision. Most reported they didn’t treat these two groups with a bifurcated approach. However, one advisor said that they often differentiate by how long the student has been enrolled:

> I think it's more different based on timeline [of where the student is in their college career]. So, if this is week three of their first semester, freshman year, and they're saying this to me, they don't get the same reaction from me, as if it's even end of the second semester. I think I'm hesitant to have students change their major too many times too early. The exposure to ... and that's part of the reason that we have the general education requirements in undergrad curriculum. Part of the reason is to give you exposure to different things. To make sure that you are making a good choice in your major and minor combination. Versus a junior that comes in, "I'm already this major, I want to add on this closely related other subject." My initial response is, "Okay, yeah, let's do it." And then typically, my follow-up is, "Are we doing double major, or major-minor?" And then, "Let's look at what classes have you already taken. What do we still need? And where
are we at on our timeline [time to degree plan]? What's the timeline looking like for you?

This approach reflects the idea that students become much informed about their interests and their ability to perform in particular majors over time. It also reflects that advisors acknowledge that students making changes to their degree programs later in their college career need to be well informed regarding the potential effects of the decision on time to degree.

**Effects of Switching on Time to Degree and Graduation**

Many students associate changing majors with possibly extending the number of semesters that it would take to graduate. As was discussed in the quantitative analysis earlier in this dissertation, this could be a valid concern.

**Time to Degree**

Advisors commonly report that time to degree issues are discussed in any discussion regarding major changes. Advisors often play a role in helping a student find a major that can maximize the usage of the credits that they already have to minimize the need for additional semesters, like this advisor:

Okay, the very next question [asked to a major switching student], for me, is all about timeline. That's a huge ... timeline ... the tie to fiscal is powerful for these students. And so I want to help them reach all of those goals. So, maybe it's a matter of, "Okay, you don't like this as a major. Where are we headed? Tell me pie in the sky, where are we going career-wise?" Then it's almost as if, could we use this as a minor? Because if you decide to stay with anything in arts and sciences, you'll likely need a minor. So, let's not lose --- and I don't want to say lose the credits, but -- let's not lose the traction or the progress you have made.

As advisors work to help major switching students minimize the amount of additional credit-taking and semesters while still facilitating the desired change, sometimes advisors need to let students know that a desired change may not be in their best interest, like this advisor:

Not that we're want to just get them out, like a factory or an assembly line, but for me, I tell them it's about time and money. Your time and your money. And sometimes, it's worth it to you to spend an extra year or so, but actually I had someone in today, she is three classes away from graduating, and she wanted to change her major to education, and it would be an additional three years. And basically, I said to her, “First of all, financial aid won't cover you for that.” That's a concern of mine. Also, I think it's more efficient if you would get your degree, then go out for your masters. And then, get your license that way. So, sometimes it's just really talking to them about time and money and is it worth it.

In other words, students sometimes consider very high-cost major changes that would require significant extension of their planned time to degree, but advisors will frequently head these changes off and advise towards alternative pathways that could accomplish similar goals.
Most advisors only discussed additional direct costs to students in terms of the additional tuition that comes with additional semesters. However, one advisor directly addressed with students that the opportunity cost of missing a year in the labor force may be an even greater cost to the student that additional tuition.

If we are going to accrue debt [through staying in school for additional semesters], then there's income we can't be generating, because we're taking the extra time to get this major, and then we're coming out making $30,000 or $35,000 that's all things that need to be considered. So, and it's interesting, because every once in a while, you'll hear parents say, well, “your advisor just wants you there longer.” The university just wants you there longer, and actually it's the opposite. I always tell my students that I love you, and I want you out in four years, so, what can we do to do it.

In general, advisors report that students are well-informed regarding the potential of extension of time to degree when making a major switching decision and take that into account as a key factor when making the decision to switch and what major to switch to.

**Probability of Graduation and Advisor-recommended Switches**

Advisors also commonly mentioned that they believe that certain major switches could potentially raise the probability of graduation for a student in certain situations. One advisor highlighted the importance of motivation when asked directly if some major switches could raise graduation:

Oh, yeah. I talk to students about motivation a lot of, if you're working towards something that you have no interest in whatsoever, how are you going to feel motivated to do a class and complete the work? Are you happy? Are you enjoying yourself? You know, yeah, it may take an extra year to graduate but I think, the satisfaction and their performance, I think, increases a lot when they're feeling more connected and more positive than they were before.

Another advisor sees a major change as a way to overcome frustration with roadblock courses and rebuild academic confidence and motivation. The advisor, describing what they would say to someone struggling that is considering a major change, said, “Right. I've seen you take the same classes three times now. So, let's put you somewhere where you will actually be able to move forward instead of just feeling stuck. And then you're going to build your confidence too, because you can do the stuff. But, right now you don't want to do this stuff.”

Several advisors reported directly recommending that a student switch their major, a fact in support of the idea that major changes can raise the probability of graduation. There are hard requirements to graduation including passing particular classes with certain grade levels and overall GPA requirements. If, by the advisor’s determination, a student is not going to be able to make those requirements in their current major, it might be in a student’s best interest to switch. One advisor described a situation when she would recommend a major switch, saying, “you're not going to graduate [with the GPA they have]. Like there are times, where you have to balance
the students’ needs [of being in a particular major] with actually getting them to graduate and actually receive a diploma at the end. That is very important no matter what your major is.”

Another advisor said that sometimes to make sure that a student has a realistic view on their prospects in a certain major. “Sometimes, I will be honest and I coach students out of majors sometimes. If you can't pass basic algebra, I don't think you're going to get through calculus [which is required for several majors]. If this is your third time taking basic algebra, maybe it's time to explore some other things that don’t have a calculus requirement.” Noting that there are still several courses in a standard sequence between basic algebra and calculus, this is probably sound advice, considering that the student had multiple chances to pass the course.

These findings support the results from the quantitative analysis that found an association between major switching and increased probability of graduation, which I thought was a counterintuitive result at first look. The situations described here and the fact that most switches are prompted by poor or lower than expected academic performance certainly explain how graduation could become more likely if students switch to major that are better fits for their academic abilities.

Serial Major Switchers

Advisors do report that they have contended with students that they consider to be serial major switchers – those that have switched several times or are always seriously considering a change in major. One advisor said that he has found individualized programs that have allowed serial majors switchers to graduate in a timely manner if they truly can’t decide on a major:

Sometimes I'll have students that have been here four years or more and they're not really yet ready to graduate, maybe they changed their major a few times, and then they'll look at one of our ... a bachelor liberal studies, or an individualized plan program and see where all my courses can fit in and how soon can I graduate and get out of here, because maybe they're being pushed from home, or run out of financial aid.

Difficulty of Major Switching

Advisors were asked whether they thought the actual process of switching majors was adequate and if they thought the process should be made easier or more difficult for students. The current process involves students doing physical paperwork, getting it signed by their academic advisor, and taking the time to turn in the paperwork. In practice, this is the equivalent of requiring an advisement appointment as most advisors will move forward on the paperwork without speaking to the student about their choice. The vast majority of academic advisors thought that the process that was in place was the right level of complexity to dissuade frivolous major changes and ensure that students receive some guidance prior to making a change. One advisor said, “I think it's fairly easy to change your major here but I at least want to talk to them. And it's not because I want to put up a roadblock, but it's to make sure they have considered
time, money, efficiency and have they made a well-evidenced decision.” A few mentioned that they would like the paperwork process to become an electronic process, but they still think that switchers should speak to an advisor prior to switching majors.

Should All Students be Undecided?

Following up on a similar question asked to the students, advisors were asked whether every freshman should be required to enter school without declaring a major. This inquiry was inspired by policies in place at other universities. The advisors were split fairly evenly on this question, with slightly over half of advisors favoring a requirement for students to enter undecided. This side was exemplified by the comments from this advisor:

I definitely think there's a benefit to waiting. If they are motivated and will take action on doing some of the assessments prior to coming to campus and that helps them narrow it down enough to declare, then that's great, but I think some of the students just need the time to get here and transition to college life and begin to explore because like you said sometimes the focus is very narrow on what they know of careers and occupations and having that class [career and life planning class required for deciding students] to really open their eyes to what all is out there is something that can be really beneficial.

Another advisor agreed that students wait to declare a major, but didn’t think it would be feasible to do so, saying, “If I'm in my ideal world. I think I would like to see them wait until at least after their first semester. However, being that we don't live in my world, I realize that that idea would be quite shocking in terms of the larger higher education system. Parents and families, I think, would have a fit.”

Another advisor also thinks it would be ideal for students to come in undecided, but thinks it is infeasible for a different reason:

I'm on this bandwagon thing believing that it would be best for all students to come in as undecided. However, with the new CCP, College Credit Plus [dual enrollment program], that's a thing of the past. Because I don't really feel that the majority of students know what they want to do until they get away from home, cut the apron strings, have a few nights out, take some classes, and start to just mature. Stuff that you can't make happen…just time and experience.

With the rapid expansion of College Credit Plus, a dual credit program, students are entering college with an increasingly large number of credits earned while still in high school. This advisor is probably right that a program limiting the ability of students to declare a major prior to entering college will be infeasible when a large percentage of students will be entering college on sophomore status.

For those advisors that said that students should be allowed to declare majors prior to coming on campus and maintaining the status quo, most of them saw the potential benefit of everyone coming in undecided. However, there were concerns about how administratively that would work and whether it would turn away students that had their mind made up on a field. Some
One advisor came up with a novel idea to help students broaden their choice sets even if they came in decided:

It would be interesting if there was a way for students to do a rank order in the first semester. Maybe you have to list your top three choices. That would be kind of cool. Maybe you're thinking Biology but you know that science isn't your strongest skillset. So, what are some other possibilities? It's almost like building in backup plans from day one. Because I tell you the sheer disappointment and the tears that flow in my office because of the final realization that, I really wanted to be a nursing major and it's just not working. They have never thought of doing anything else. It's heartbreaking.

This would allow students to come in with a declared major but ensure that they at least thought about some alternative choices earlier in their career, a suggestion that is somewhat akin to the concept of “meta-majors”, which is described in the later policy scan chapter of this dissertation.

Additional Resources

When asked about what additional resources would help them do their jobs better, the advisors almost universally replied that they could use more time. Several advisors remarked that this could be done by lowering student loads, which would likely have to be done by hiring additional advisors. Most advisors have only the first hour and last hour of their day to prepare for and follow up with all of their appointments throughout the day. Several advisors mentioned that they would like more time to be to build more relationships with students and do more proactive outreach and follow-up.

Advisors in general are satisfied with the professional development opportunities that they have. However, several advisors mentioned their desire for additional training in career advising. While there is a separate career center on campus (which receives good reviews from academic advisors) staffed with trained career advisors, the major decisions that are being advised go hand-in-hand with career discussions. It is fairly difficult to separate the two, particularly for professional programs like education and nursing. One advisor had this to say on the topic:

I think there are a lot of expectations on us as advisors to do a lot of that career advising. And to help people understand the job search and the job field and everything. And while I'm an academic advisor, I'm an expert on the curriculum. I know how to get you through this in four years. But if you sit here and ask me what are all those careers I can have in a certain field ... I don't know. And for me to sit down and do all of that research is a lot of time.

Another advisor took it a step further and thought it would be beneficial to have a trained career advisor co-locate in their office:
It's a great time to be an advisor, we have some administrators in place where we do a lot of professional development. We have like, monthly luncheon meetings and we do things like that. We just had a day-long conference about academic advising and career planning, and how juxtapose them, so that's really cool. So, I think we get a lot of that, but could we have more? Sure. And maybe we need to, it used to be we would have one person from the career center in our office two days a week. I'd love that. I wish we had that back.

A few other advisors, particularly the pre-major advisors, were interested in seeing more metrics on the outcomes of the students that they advised. For the pre-major advisors, students leave to a new academic advisor once they declare a major. If they had a particularly good relationship, a student may contact them again, but they don’t really hear anything about those students again. Some advisors were interested in seeing metrics on the quality of those students’ major choices, such as how often students stick with their original major declaration and their graduation rate.

Conclusion

This analysis has taken a close look at how several different kinds of academic advisors at one university deal with both students that are making their initial major selection and with major switching students. While these academic advisors work within particular set of policies and procedures at their university and their state system, the overriding themes that they touch on are very likely present for academic advisors across the country. After covering what factors students use to make their decision, what sources of information they use, which external influences are most powerful, and what additional resources they desire, among many other things, there are several important takeaways that are important to summarize here.

Summarized Findings

- First, advisors play an active role in helping deciding students create their choice sets.
  - Often the easiest task is for students to reduce the number of majors under consideration by eliminating majors that the student is certain that they do not want to do.
  - Another key activity is to give deciding students concrete steps to follow to give them a sense of accomplishment and progress towards making a decision.
  - In concert with these practical recommendations, advisors also serve a role in helping student make the life transition from high school to college, which traditionally is the first time that students are living away from their parents.
  - Some advisors are much more comfortable with this role than others and take on what they feel comfortable with. Some advisors are trained counselors with tissues on their desk or ensure the students are in the right frame of mind through mindfulness activities before getting down to advisement.
Others are quick to refer students to counseling services through the university and prefer to stick to their core responsibilities of academic advisement. Either way, these issues are a challenge for all advisors.

- When it comes to major switching, advisors play a key role in helping students avoid particularly costly major switches.
  - At the university at which the interviews were conducted, students need to get a sign-off from the academic advisors to switch their major, which is a de facto requirement to see an advisor prior to a switch.
  - At this meeting, advisors often provide important information on the time to degree implications of a potential major switch and actively dissuade potentially costly choices.
  - On the other side of the coin, advisors can and will advise struggling students to change their major in an effort to raise their probability of graduation or at least doing so in a timely manner if the student has displayed an inability to handle the coursework in their current major.
Chapter Six: University-specific Analysis of Major Selection Behavior

This section of the dissertation describes a quantitative analysis of major selection and switching trends using detailed student records from a public university in Ohio. The analyses of nationally representative data described earlier in the dissertation will be replicated here along with some additional analyses that are allowed by the more fine-grained nature of this data. It also quantitatively explores some of the themes that were discussed by students and advisors in the preceding qualitative analyses.

Data and Methods

Data

Semester by semester student records were received from the institutional research department of the same university at which the preceding qualitative research was performed. I requested the academic records for all first-time full-time (FTFT) students who were enrolled at the main campus from 2010 onwards. The data files that were received only contained the records for all FTFT students who started in the Fall 2010 semester or later who graduated by the end of the Fall 2017 semester. Complete records were not received for students that had not graduated, meaning any students who had stopped out without completing or were still enrolled were not observed. Thus, all analyses in described here concerns only the population of graduates over this period. The data included demographic information, academic ability in high school, and starting credits for each student along with semester-specific information on the degree program, term and cumulative GPA and cumulative credits earned. The information includes observations for fall and spring semesters. Credits earned over a summer semester are included in next fall semester record.

There are 61,490 student semester records included in the original database. Students that were at any time enrolled in an associate’s degree program (264 semesters), one student that was enrolled in a master’s degree program (6 semesters), students with fewer than 101 credits in their final observation (516 semesters), students whose final major at graduation was not observed (22 semesters), and students who were enrolled for fewer than 4 or fewer semesters that started with fewer than 30 credits (10 semesters) were all removed from the database because they didn’t appear to meet inclusion criteria or appeared to be incomplete records. Students that began in later than the Fall 2013 semester were also excluded from the database (581), as the vast majority of students in these later starting cohorts are still enrolled and the number of graduated
observed from these groups was very low. This leaves 60,091 student semesters recorded by 7,320 graduates from four starting cohorts in the final analytic database.

Measures

Several of analyses in this chapter rely on the measure of a major switch. For all analyses, major changes are defined as any change in a student’s degree program from one semester to the next. This includes switching from one major to another, adding a major to an existing major, or dropping a major from a multiple major program. Transitioning from a pre-major status to being fully accepted into a major program does not count as a major switch. Declaring a major after being undecided, either as a deciding student or being undecided in college, also does not count as a major switch. All major switching measures do not consider academic minors or membership in pre-professional programs, such as “pre-med”, which exist separately from majors at this university.

Methods

This analysis uses several regression techniques to describe the association of various major choice and major switching behaviors with student outcomes of interest, including time to degree and credit hour accumulation at graduation. Different regression models were chosen based on their compatibility with the structure of the data and nature of the dependent variable being examined. Two different analytic data sets were prepared. The first included one record for every student semester, meaning that there are repeated observations over time for each student. For models using this data, a logit model designed for use with panel data was used, as the dependent variable was dichotomous.

The second analytic data set included one observation for each student and concentrated on ultimate outcome variables. For positive integer count dependent variables, negative binomial regression models were used. For continuous variables, linear regression models that control for fixed effects of final major choices were used. For variables with dichotomous dependent variables, generalized linear models with logit link functions were chosen. In all models, a robust set of control variables were included. The specific models for each specification are described in greater detail in the specific sections below.

Descriptive Statistics

Four entering cohorts of students were included in the analysis. These students were all first-time full-time students that have graduated from the university with a bachelor’s degree. Note that this does not include any transfer students. The statistics of these students at enrollment are described in Table 7.1. The declining number of students over time mainly denotes the presence of some “right censoring” of the data. This means that an increasing number of students over time are still enrolled and we have yet to observe their outcome. Only 4.5 years have passed
since the entrance of the 2013 cohort have entered, so this is to be expected. The academic profile of the entering students (meaning their high school GPA and ACT score) slightly increases over time likely due to a correlation between academic ability and completion time. Those students in the 2013 cohort that did graduate by the end of the observation period did so in a fairly timely manner, but this correlation is controlled for in all of the regressions. The heavily female lean of the student body – nearly 63% - is standard as a higher percentage of females than males attend college. On average, nearly 23% of graduates in each starting cohort begin their time at the university without a declared major.

### Table 7.1 - Descriptive Statistics of University Graduates at Enrollment

<table>
<thead>
<tr>
<th>Starting Cohort</th>
<th>N</th>
<th>Mean High School GPA</th>
<th>Mean ACT Score</th>
<th>Percent Female</th>
<th>Average Credit Hours at Enrolment</th>
<th>Percent with Declared Major at Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>2,084</td>
<td>3.32</td>
<td>22.76</td>
<td>59.5%</td>
<td>4.5</td>
<td>77.1%</td>
</tr>
<tr>
<td>2011</td>
<td>1,985</td>
<td>3.36</td>
<td>22.89</td>
<td>62.3%</td>
<td>4.8</td>
<td>77.3%</td>
</tr>
<tr>
<td>2012</td>
<td>1,859</td>
<td>3.36</td>
<td>22.83</td>
<td>63.0%</td>
<td>5.4</td>
<td>77.2%</td>
</tr>
<tr>
<td>2013</td>
<td>1,392</td>
<td>3.48</td>
<td>23.62</td>
<td>62.6%</td>
<td>7.1</td>
<td>83.7%</td>
</tr>
<tr>
<td>Total</td>
<td>7,320</td>
<td>3.38</td>
<td>23.0</td>
<td>62.6%</td>
<td>5.3</td>
<td>78.4%</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Includes only first-time full-time students that graduated prior to Spring 2018. Credit hours at enrollment, include AP credit and high school dual enrollment programs. Students with transfer credits are not included in sample.

Table 7.2 describes the student’s outcomes of interest at graduation by entering cohort. The average graduate had taken 132 credits at graduation, which is 10 more than the 122 that are required. The average number of major changes per graduate was 0.55 and the average graduate spent a little more than half of a semester undecided. About 20% of graduates changed their major when they were juniors or seniors.

### Table 7.2 - Descriptive Statistics of University Graduates at Completion

<table>
<thead>
<tr>
<th>Starting Cohort</th>
<th>N</th>
<th>Mean Cumulative GPA</th>
<th>Mean Cumulative Credit Hours</th>
<th>Mean Number of Fall &amp; Spring Semesters</th>
<th>Mean Number of Semesters Spent Undecided</th>
<th>Mean Number of Major Switches</th>
<th>Percent with Major Switch as Upper Classperson</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>2,084</td>
<td>3.17</td>
<td>133.0</td>
<td>8.4</td>
<td>0.72</td>
<td>0.58</td>
<td>21.8%</td>
</tr>
<tr>
<td>2011</td>
<td>1,985</td>
<td>3.23</td>
<td>132.4</td>
<td>8.4</td>
<td>0.61</td>
<td>0.59</td>
<td>21.7%</td>
</tr>
<tr>
<td>2012</td>
<td>1,859</td>
<td>3.28</td>
<td>131.4</td>
<td>8.2</td>
<td>0.54</td>
<td>0.53</td>
<td>18.9%</td>
</tr>
<tr>
<td>2013</td>
<td>1,392</td>
<td>3.44</td>
<td>130.9</td>
<td>7.7</td>
<td>0.36</td>
<td>0.48</td>
<td>15.9%</td>
</tr>
<tr>
<td>Total</td>
<td>7,320</td>
<td>3.26</td>
<td>132.0</td>
<td>8.2</td>
<td>0.57</td>
<td>0.55</td>
<td>19.9%</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Includes only first-time full-time students that graduated prior to Spring 2018. Cumulative credit hours do not include credits taken in final semester if student was a summer graduate.

The descriptive statistics divided by whether a student changed their major at least once or not can be found in Table 7.3. Just under 41 percent of graduates changed their major at least
once. Major switchers and non-switchers had very similar academic profiles in high school in terms of GPA, ACT scores, and average college credit hours earned. Major switchers were more likely to be male and more likely to have declared a major prior to the start of their freshmen year. Table 7.4 describes the student outcomes of major switchers and non-switchers. Major switchers graduated with a lower GPA and a higher number of cumulative credit hours. Non-switchers spent a longer time without a declared major and took fewer semesters to graduate on average. The average graduate that did switch their major did so 1.35 times, showing that a good percentage of the switchers did so more than once.

Table 7.3 - Descriptive Statistics of Major Switchers and Non-switchers at Enrollment

<table>
<thead>
<tr>
<th>Switched Major?</th>
<th>N</th>
<th>Mean High School GPA</th>
<th>Mean ACT Score</th>
<th>Percent Female</th>
<th>Average Credit Hours at Enrollment</th>
<th>Percent with Declared Major at Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>4,323</td>
<td>3.40</td>
<td>23.04</td>
<td>63.9%</td>
<td>5.6</td>
<td>74.5%</td>
</tr>
<tr>
<td>Y</td>
<td>2,997</td>
<td>3.34</td>
<td>22.89</td>
<td>61.7%</td>
<td>5.0</td>
<td>84.1%</td>
</tr>
<tr>
<td>Total</td>
<td>7,320</td>
<td>3.38</td>
<td>23.0</td>
<td>62.6%</td>
<td>5.3</td>
<td>78.4%</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Includes only first-time full-time students that graduated prior to Spring 2018. Credit hours at enrollment, include AP credit and high school dual enrollment programs. Students with transfer credits are not included in sample.

Table 7.4 - Descriptive Statistics of Major Switchers and Non-switchers at Completion

<table>
<thead>
<tr>
<th>Switched Major?</th>
<th>N</th>
<th>%</th>
<th>Mean Cumulative GPA</th>
<th>Mean Cumulative Credit Hours</th>
<th>Mean Number of Fall &amp; Spring Semesters</th>
<th>Mean Number of Semesters Spent Undecided</th>
<th>Mean Number of Major Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>4,323</td>
<td>59.1%</td>
<td>3.33</td>
<td>131.0</td>
<td>8.05</td>
<td>0.73</td>
<td>0</td>
</tr>
<tr>
<td>Y</td>
<td>2,997</td>
<td>40.9%</td>
<td>3.17</td>
<td>133.5</td>
<td>8.44</td>
<td>0.34</td>
<td>1.35</td>
</tr>
<tr>
<td>Total</td>
<td>7,320</td>
<td>100%</td>
<td>3.26</td>
<td>132.0</td>
<td>8.20</td>
<td>0.57</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Includes only first-time full-time students that graduated prior to Spring 2018. Cumulative credit hours do not include credits taken in final semester if student was a summer graduate.

It can be difficult to ascertain the magnitude of the changes from initial enrollment to the programs that students are enrolled in when they graduate. Figure 7.1 is an effort to visualize the frequency and size of changes and the status of students at enrollment and graduation all in one place. The counts and the thickness of the bars on the left side of the graph denote how many students are enrolled in each college or the deciding students program at the beginning of their freshmen year. The counts and the thickness of the bars on the right edge of the graph denote the number of students that graduate with a degree in that college. The thickness of the bars in the middle of the graph denote how many students flowed from their original location at enrollment to the corresponding final destination at graduation. Note that this figure shows only the major switches that involved changes in colleges. This is a very conservative picture of major
switching behavior as it does not depict any switches to program within college (ex. accounting to marketing or physics to history).

The college of business and the college of music both saw a net reduction in students over time, even with the distribution of nearly 1,000 deciding students to other colleges. All of the majors in the college of music and business have barriers to entry in some form (audition requirements for music and elevated cumulative GPA requirements and a required calculus course for business) while most of the other colleges have many majors that have standard fairly nominal transfer requirements. Nevertheless, there was significant college switching activity overall. Nearly one third of the graduates with a degree in the college of arts & sciences, college of education, and the college of health and human services did not begin their college career enrolled there.
Figure 7.1 – Flow of Graduates Between Initial College and College at Graduation

Source: University academic records

Note: The left side of the graphs shows college enrollment at 1st semester. The right side shows college enrollment at graduation. The thickness of the lines denotes the size of the flow between the two colleges from 1st semester to graduation.

Prediction of Switches

This section of the chapter will review a regression model used to describe the relationship of student characteristics or measures of student performance and propensity to switch majors. This
model uses the semester by semester academic records of all graduates in the 2010-2013 cohorts. Since there are repeated observations from the same individuals over time, a panel model was used. The dependent variable is a dichotomous variable denotes whether or not a major switch occurred in that semester.

**Effects of Previous Term and Cumulative GPA on Probability of Switching Major**

In the qualitative analysis of major switching, the primary reason cited by students for major switching was poor academic performance. This model examines that claim quantitatively to see if students with lower GPAs are more likely to switch their majors than those with higher GPAs. A student receives information on their term and new cumulative GPA at the end of the term, so the associated major switches were not recorded until the next semester. Thus, a lagged variable structure was used where the association of the previous semester term GPA and cumulative GPA with major switches in the “current” quarter was examined. The panel structure controls for the time-invariant student level variables. The time-varying covariates of class standing and random effects for the enrolled term (the “time” variable in this model). The results from three regression models (the main model and two alternative specifications) can be found in Table 7.5.

### Table 7.5 – Association of Grade Point Average on Probability of Major Switching

<table>
<thead>
<tr>
<th>Major Switch in Current Semester</th>
<th>(1) Panel Logit</th>
<th>(2) Restricted Sample Panel Logit</th>
<th>(3) Panel Logit with GPA Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous Term GPA</td>
<td>0.805***</td>
<td>0.799***</td>
<td>0.898</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.1)</td>
</tr>
<tr>
<td>Previous Term Cumulative GPA</td>
<td>0.858**</td>
<td>0.863**</td>
<td>0.974</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.05)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Term GPA X Cumulative GPA (previous term)</td>
<td></td>
<td></td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.03)</td>
</tr>
<tr>
<td>AME for Previous Term GPA (percentage)</td>
<td>-21.5%***</td>
<td>-22.5%***</td>
<td>-23.4%***</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.05)</td>
<td>(0.05)</td>
</tr>
<tr>
<td>AME for Previous Cumulative GPA (percentage)</td>
<td>-15.3%**</td>
<td>-14.7%**</td>
<td>-15.4%**</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Class Standing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td>1.05</td>
<td>1.13**</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.07)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Junior</td>
<td>0.678***</td>
<td>0.744***</td>
<td>0.688***</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.05)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Senior</td>
<td>0.358***</td>
<td>0.393***</td>
<td>0.368***</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.04)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Observations</td>
<td>48,001</td>
<td>39,205</td>
<td>48,001</td>
</tr>
<tr>
<td>Students</td>
<td>7,316</td>
<td>5,924</td>
<td>7,316</td>
</tr>
<tr>
<td>2013 Starting Cohort</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Interaction Term</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: AME = average marginal effects. Base level for class standing is likelihood of switching as a freshman. Robust
standard errors in parentheses. Reported coefficients are odds ratios. *** p<0.01, ** p<0.05

These results show that lower GPAs in the previous term are associated with an increased hazard to switch majors in the current term. For the average graduate, the odds of a major switch for a student with a 4.0 GPA in the previous term is 80.5% of the odds of a major switch for a student with a 3.0 GPA in the previous term. In other words, every one point increase in previous term GPA makes a major switch in the next term 21.5% less likely. Higher cumulative GPA is also associated with a reduced likelihood of major switch, but not as strongly as term GPA. A one point increase in cumulative GPA is associated with a 15.3% reduction in major switches in the next semester. The results use current class standing as a control variable, and the interpretation of these coefficients is also telling. Juniors are 38.9% less likely than those on freshman status to change their major. Those on senior status are 103% less likely than freshmen to switch their major. The results from the alternative model specifications are not practically significantly different from the main model.

Cost of Major Switches

This section of the chapter will review regression models used to describe the relationship of between major choice behaviors and student outcomes at graduation. Two different dependent variables were analyzed. One is the cumulative number of credits accrued at graduation. Students are required to take 122 credits for graduation, so any number of credits beyond this number suggests some sort of inefficient course taking. The other dependent variable is the number of semesters enrolled prior to graduation. Most bachelor degree programs are designed to be able to be completed in four years or eight semesters. Any number of semesters beyond that also suggests some sort of inefficient course taking or changes to degree programs that extended time to degree. These models use individual student observations derived from the semester by semester academic records of all graduates in the 2010-2013 cohorts. Linear regression models were used for both models

Time to Degree

For the analysis of the association of major choices with time to degree (as represented here by the number of semesters enrolled prior to graduation), a linear regression model with fixed effects for major at graduation was used. A suite of covariates was used in the model to control for several student characteristics that may correlate with time to degree, including student ability (as represented by ACT scores and high school GPA), ethnicity, gender, college credits earned in high school, ability in college (as represented by cumulative GPA at graduation), time fixed effects (as represented by entering cohort membership), and the aforementioned fixed effects for major at graduation. The results of this regression are shown in Table 7.6.
Table 7.6 – Association of Major Choice Behavior with Number of Semesters Enrolled

<table>
<thead>
<tr>
<th></th>
<th>(1) Linear Regression w/ Major Fixed Effects</th>
<th>(2) Linear Regression w/ Major Fixed Effects – No Timing of Major Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing of Initial Major Declaration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Freshman Year</td>
<td>0.145*** (0.04)</td>
<td>0.155*** (0.04)</td>
</tr>
<tr>
<td>During Sophomore Year or Later</td>
<td>0.618*** (0.05)</td>
<td>0.621*** (0.05)</td>
</tr>
<tr>
<td>Number of Major Switches</td>
<td>0.004 (0.04)</td>
<td>0.241*** (0.02)</td>
</tr>
<tr>
<td>Class Standing at Last Major Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>0.06 (0.06)</td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td>0.31*** (0.06)</td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>0.51*** (0.07)</td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td>0.84*** (0.1)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>5,662</td>
<td>5,662</td>
</tr>
<tr>
<td>2013 Starting Cohort</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Timing of Major Switches</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Base level for “timing of initial major declaration” is declaring prior to enrollment. Base level for “class standing at last major switch” is not switching majors at all. Robust standard errors in parentheses. *** p<0.01, ** p<0.05

I find that there is a positive association between some major selection behaviors and extended time to degree. Compared to graduates that made their initial major choice prior to enrollment, graduates that declared their first major during their freshmen year took an additional 0.145 semesters to graduate. Students that waited until during their sophomore year or longer make their initial major selection took an additional .618 semesters to graduate compared to pre-enrollment declarers.

Conventional wisdom is such that it is thought that multiple major switches associate with longer times to degree. This association is present in a simple model, but disappears when controls for the timing of major switches are added to the model. I find no significant relationship between the number of switches alone and time to degree. Instead, I find a significant increasingly positive relationship between a timing of selection of a student’s final degree program and time to degree. There is no significant difference in time to degree between those that never switch their major and those that make their latest major switch in their freshmen year. Students in who make their last major switch during their sophomore year take .31 semesters longer to graduate on average than those that never switch majors. Those students that make their last switch on junior or senior status take 0.51 and 0.84 semesters longer, respectively, than students that never switch majors. These results would suggest that major
switching during freshmen year is low cost, but there is a cost, in terms of additional time to degree, to switching during their sophomore year or later. Alternative specifications that included interactions between timing of initial declaration and class standing at last major switch did not have significantly different results, so the results from these models are not reported here.

**Cumulative Credits Taken**

Beyond the significant cost of adding additional terms onto a degree program, students often end up needing to take “excess credits” to complete their degree programs. At the university studied here, a minimum of 122 credits are required to graduate. Any level of cumulative credits accrued at graduation beyond 122 suggests some sort of inefficient use of credits, perhaps to taking credits that do not apply to their chosen degree program. In some states (but not in the state studied here), excess credit fees (in the form of an increase in tuition) are applied when students reach a particular threshold above the required credits for graduation. As evidenced by the Figure 7.2, there are a significant number of students that have accrued a great deal of excess credits at graduation.

**Figure 7.2 – Histogram of Cumulative Credit Hours Earned by Graduates**

Source: University academic records

Note: A minimum of 122 credit hours are required to graduate from this university (shown as the dotted line). Shows Fall and Spring semester graduates only.
For the analysis of the associations between major choice behavior and excess credit taking, a linear regression model with fixed effects for major at graduation was used. The same list of covariates as the time to degree model were used in this model. The results of this regression can be found in Table 7.7.

Table 7.7 – Association of Major Choice Behavior with Cumulative Credits Earned at Graduation

<table>
<thead>
<tr>
<th>Timing of Initial Major Declaration</th>
<th>(1) Linear Regression w/ Major Fixed Effects</th>
<th>(2) Linear Regression w/ Major Fixed Effects – No Timing of Major Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Freshman Year</td>
<td>2.02*** (0.41)</td>
<td>2.16*** (0.42)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Sophomore Year or Later</td>
<td>4.88*** (0.52)</td>
<td>4.98*** (0.53)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Major Switches</td>
<td>-0.15 (0.41)</td>
<td>3.52*** (0.24)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class Standing at Last Major Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>1.74*** (0.67)</td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td>4.21*** (0.62)</td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td>7.80*** (0.86)</td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td>13.35*** (1.25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>5,662</td>
<td>5,662</td>
</tr>
<tr>
<td>2013 Starting Cohort</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Timing of Major Switches</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Base level for “timing of initial major declaration” is declaring prior to enrollment. Base level for “class standing at last major switch” is not switching majors at all. Robust standard errors in parentheses. *** p<0.01, ** p<0.05

I find that there is a significant positive relationship between certain major selection behaviors and excess credit taking. Compared to students that select a major before they come to campus, students that make their first choice during freshman year accumulate an additional 2 credits at graduation. Students that make their initial major declaration during their sophomore year or later accumulate nearly 5 additional credits compared to the average pre-enrollment decider.

Just as with the model of semesters enrolled prior to graduation, the number of major switches had a positive association with more credits at graduation in a simple model, but this association disappears when the timing of the last switch is added to the model. Later final major switches have a positive increasing significant association with excess credit taking. Students that make their final major switch in their freshmen or sophomore years take 1.74 and 4.21
additional credits, respectively, prior to graduation compared to students that don’t switch their major at all. Students that make their final major switch in their junior or senior years take an additional 7.8 and 13.35 credits, respectively, compared to students that did not switch their majors at all. These results largely mirror the results from the model that examined semesters taken to degree, with the exception that final switches during freshman year were associated with slightly increased credit hours, but not increased semesters to graduation.

**Switches into “Difficult” or Heavily Sequenced Majors**

The qualitative conversations described earlier in this dissertation with students and academic advisors described certain majors that had long or very structured course sequences that, if not started early in one’s college career, could lead to extended time to degree. One such degree, early childhood education, was selected to be analyzed based on qualitative descriptions of the difficulty of finishing this degree in four years if students switched into it and the fact that it was a popular major at the university and so potentially provides a large enough sample size for the appropriate power for statistical analysis. Versions of the previous regression models were undertaken restricted to early childhood education graduates in an effort to see if “in-switchers” took longer to obtain a degree than those who initially selected the major and stuck with it. While the point estimate of the association between and in-switching into the major was positive and potentially practically significant, there was not enough power to find a statistically significant association between the behavior and outcome of interest.

One of the biggest problems with this type of analysis is that students switch into hard difficult majors or those majors identified as one that could significantly lengthen time to degree at low rates. As was discussed in the qualitative section in this paper, students are required to essentially required to meet with academic advisors prior to switching majors. At these meetings or by self-advising by doing an online graduation plan in a new major, students are normally well-informed regarding any time to degree consequences of the major switches under consideration. Since potential impacts on major-switching costs are known to the student at the time of switching, higher cost major switches are presumably considered with these costs in mind.

**Analysis of the Major Choice Quality of Deciding Students**

A large section of this dissertation focused on the process by which students made their initial major decisions and featured students that were participating in a deciding student program that, at a minimum, provided academic advisors specifically trained to work with exploratory students and events and other activities meant to help deciding students make a good initial major declaration. In theory, this should lead participants to make a better choice (meaning that it would be more likely to be their final choice) than they would have otherwise. At this university, enrolling undecided students have two options: participate in the deciding students
program or enroll undecided in a college. There is a third home for undecided students, a conditional admit program for low-income first-generation students, who are required to enter without a major. Controls for participation in this program are included in the models described here. With the specific services provided by the deciding students program, the natural hypothesis is that they might make a higher-quality initial major choice than other undecided students that did not receive the same suite of services. Thus, these models will include only students that entered the university undecided and did not declare a major prior to enrollment.

The regression models described here will examine whether participation in the deciding students program at this university is associated with low- or no-cost major selection behavior. Because of collinearity issues, it is difficult to directly examine the impact of deciding student program participation on the outcomes of interest – time to degree and excess credit taking – while still controlling for declaration time and major switching behaviors. Thus, these models will look at the association of deciding student program participation with intermediate outcomes that could lead to poor ultimate outcomes.

**Deciding Student Program and Number of Major Switches**

The first model will examine potential associations between deciding student program participation and the frequency of major switches after the initial declaration. Because the dependent variable in this case is a positive integer count, the best regression model is Poisson or negative binomial regression. In this case, the variance is greater than the mean of the dependent variable, meaning that the variable is over-dispersed. This means that negative binomial regression is the ideal structure for this model and this is what was used in this case. This model also controls for exposure to the dependent variable. A student can only switch their major if they had a declared major in the previous semester, so the number of semesters in which they had a major in the previous semester could be a factor in the number of switches made. This exposure to the possibility of a major switch is controlled for as part of this model.

**Table 7.8 – Association of Deciding Student Participation with Frequency of Major Switches**

<table>
<thead>
<tr>
<th>Frequency of Major Switches</th>
<th>(1) Negative Binomial Regression – Undecided Entering Students Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deciding Student Participation</td>
<td>-0.34***</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
</tr>
<tr>
<td>Low-income, First-gen Program</td>
<td>-0.25</td>
</tr>
<tr>
<td>Participation</td>
<td>(0.14)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,478</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Base level for comparison is all other undecided students. Robust standard errors in parentheses. *** p<0.01, ** p<0.05
I find that, among graduates, the average participant in the deciding student program switched their major 0.34 fewer times than did the average student who began their college career as undecided in a college, as shown in Table 7.8. There was no significant difference between the major switching rates of participants in the low-income, first-generation undecided program and students who enrolled undecided in a college.

**Deciding Student Program and Potentially High-Cost Major Switches**

In previous results, it was shown that there was an increasing positive relationship between the class standing at which the last major choice took place and time to degree and excess credit taking. In particular, switching majors during junior year or later was associated with extended time to degree and excess credit taking. One mark of a successful deciding students program would be getting participating students to avoid potentially high-cost major switches. This model examines the association between participating in the deciding students program and the likelihood of making a major switch while on upper-class status. A generalized linear model with a logit link function was used to model this relationship, as it gives the ability to control for exposure to possibility of making a final major declaration during the junior or senior year. If a student was enrolled for more semesters as an upper-class person, she or he had more opportunities to switch their major during that time period. This model controls for that additional exposure to opportunities to switch majors during that time period. This model also controls for the same suite of covariates as the other models described in this section. The results of this regression are shown in Table 7.9.

**Table 7.9 – Association of Deciding Student Participation with Potentially High-Cost Major Switches**

<table>
<thead>
<tr>
<th>Final Major Switch During Junior Year or Later</th>
<th>(1) Negative Binomial Regression – Undecided Entering Students Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deciding Student Program Participation</td>
<td>0.64*** (0.09)</td>
</tr>
<tr>
<td>Low-income, First-gen Program Participation</td>
<td>1.1 (0.27)</td>
</tr>
<tr>
<td>AME for Deciding Student Program Participation</td>
<td>-6.52*** (2.04)</td>
</tr>
<tr>
<td>AME for Deciding Student Program Participation</td>
<td>-28.9%***</td>
</tr>
<tr>
<td>Observations</td>
<td>1,415</td>
</tr>
</tbody>
</table>

Source: University academic records
Note: Base level for comparison is all other undecided students. Robust standard errors in parentheses. Reported Coefficients are odds ratios. AME = average marginal effect. *** p<0.01, ** p<0.05
I found that graduates that participated in the deciding students program were associated with a significantly reduced prevalence of making a late major switch as an upper-class person, compared to students who began as undecided in a college. The average graduate who participated in the deciding students program had a 28.9% lower likelihood to have made a major switch as an upper-class person, compared to other undecided students who did not participate in the program. This is a 6.52 percentage point reduction in the late major switching rate. There was no statistically significant difference between the late major switching rate of those who were undecided in college and those students who participated in the low-income, first generation program.

Limitations

A major limitation of this work is that the data only includes graduates, which precludes any work on the effect of major choices and switching on probability of graduation. As such, this work should be considered applicable to graduates and there may be additional or different associations of major choices and outcomes for students that did not graduate. Another limitation is that this data only covers students at one university. These same associations may not carry over to students at other universities whose policy environment and set of offered majors may be different. Another limitation is that financial aid data, which could have an association with time to degree and completion rates, was not made available to me. Ideally, the financial aid received by each student would be incorporated into these models as a control variable if it was available.

In addition, the nature of this data only shares the final major choice for each semester. If a student switches their major multiple times within one semester, only the final major choice is observed. The intra-semester changes are not observed, meaning that the prevalence of switching may be slightly conservatively calculated in this data, depending on how common it is to switch majors multiple times in one semester. Based on the interviews discussed earlier in the dissertation, this does not seem to be a common behavior, but it does rarely happen.

Another limitation of this work is that there is almost certainly some degree of selection bias on unobservable characteristics present in these models. For instance, students who declare late or switch majors late may have some sort of inherent personal characteristic that leads to longer time to degree. Perhaps these students have an unobservable taste or preference for remaining in school longer or taking additional classes and a late major switch is how they justify this behavior to their family and friends. There are many unobserved characteristics that could potentially confound these analyses. This is addressed by the fact that and results are framed merely as association between variables and no causal relationship is claimed in any of the models described here. Results should be interpreted with these facts in mind. Nevertheless, most of these analyses were undertaken because they were discussed during interviews with the very students (and their academic advisors) are being quantitatively studied here. These associations
are not causal, but the premise of the relationship between these behaviors and outcomes is backed up by the previous qualitative work.

Discussion

There is a strong correlation between particular major selection behaviors and student outcomes, even when controlling for a broad group of observable characteristics. In general, student indecision on their major during the freshmen year doesn’t appear to be a big issue. Students that enter undecided and make their initial decision during their freshmen year or decided students that make their final major switch in their freshmen year do not see practically significant costs in terms of additional semesters or excess credits associated with these behaviors. However, waiting to make an initial major declaration until during sophomore year or later is associated with significantly increased time to degree. On average, approximately six out of every ten students that wait to make their initial major declaration until they are in their third semester or later will take an additional semester (beyond the designed eight semesters) to graduate.

For major switching behavior, it appears that timing of a student’s final switch is the important factor in terms of time to degree and excess credit accumulation. While conventional wisdom might say that multiple major switches would be a serious problem, this does not appear to be this case as long as the final degree program was selected early in a student’s career. The later that the final degree program was chosen, the more time was spent enrolled prior to graduation and the excess credits were taken. This would suggest that efforts should be taken to ensure that students are satisfied with their choice as early as possible in their college career.

It emerged in the qualitative portion of this dissertation that students reported poor academic performance as the most common reason for major switching. Quantitative results from this analysis appear to corroborate that finding. Students that have lower cumulative GPAs or lower term GPAs are associated with a much higher likelihood of switching majors during the next semester. This suggests that universities might be able to identify students most at risk for changing their major (students with lower GPAs, including those with higher cumulative GPAs that have a poor semester) after each term and target them for additional advising or information.

Graduates that had participated in the deciding student program at the university under study appear to change their major less frequently and are less likely to make a major switch as an upper-class person, as compared to undecided students that did not participate in the program. This suggests that all undecided students might benefit from the larger range of services offered by the deciding students program and should be encouraged to participate rather than enroll as undecided in a particular college.
Conclusion

The analyses contained here in this chapter look at the associations between certain major selection behaviors and student outcomes of interest for the eventual graduates from four starting cohorts (2010-2013) of first-time full-time undergraduates at a public university in Ohio. 21.6 percent of these students entered the university without a declared major. Just less than 41 percent of these graduates over this time period changed their major at least once. The timing of initial major declaration and major switching behavior have a strong correlation with time to degree and excess credit taking. In particular, major switching as an upper-class person is associated with much increased time to degree and excess credit taking. Entering undecided as a freshman or switching majors as a freshman have little to no association with extended time to degree credits taking, which suggests that students should feel free to explore their options during their initial year on campus. Deciding students or exploratory programs might be a good option for an undecided freshmen student, as participation in such a program at this university was associated with a reduction in high-cost major switching activity later in their college career.
Chapter Seven: Policy Scan

This chapter of the dissertation reports the results of a review of publicly available information on policies and programs around the country that different entities have put into place regarding major selection issues. This policy scan allows me to identify the range of policies on major selection that are currently in place at several universities. It also allows for the assessment of the implications of the preceding findings on the major policy initiatives identified here, which is found in Chapter Eight.

University Policies

The approach to guidance on major selection and how to handle major deciding students varies widely from university to university. One can look internationally to Chile to see an extreme example of system that locks students in to majors and imposes significant costs to those that change. Students there apply to specific major and university combination. The ability to transfer between programs is so limited that most students that want to switch programs must drop out and reapply to start over in another desired major/university combination (Bordon and Fu, 2015). On the other hand, very permissive systems like the one at many universities in the United States only lightly restrict transfers between majors and allow students to apply undeclared and remain so until they find a major choice that they like. The university studied in this dissertation is one that allows students to apply undeclared and remain so as long as they remain in good academic standing.

However, these policies can vary widely between universities and even different colleges and programs within one university. It is often the case that universities will have more selective admissions for particular majors. At UCLA, undergraduate applicants apply to a desired major (with an option for entering undeclared). Undergraduate admission reviews all applicants and applicants to majors within the UCLA College of Letters and Science (which includes those wishing to enter undeclared) undergo no additional screening. Applicants to all other schools, including the Samueli School of Engineering and Applied Science and the School of Theater, Film, and Television, will go through an additional round of scrutiny by representatives from each school and are selectively admitted by major. These majors that are selectively admitted also have fairly onerous requirements for students wishing to change majors (or transfer from

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19 However, several of these majors admit students on “pre-major” status, where students must complete prerequisites to be fully admitted into the major.

20 There is an option to apply undeclared – engineering and applied science which is selectively admitted as well.
another university) into these programs. This is of course necessary to eliminate the possibility of applying to a non-selective major and switching as soon as possible into the selective major.

This amalgamation of policies across colleges and majors within a university is extremely common, if not ubiquitous, across the country. Along with differential sets of offered majors between universities, this makes it difficult to study to study major selection and major switching on a broad scale across universities. It also puts additional burden on those students interested in majors that are specifically selective admitted, first, to be aware of these policies at each of the schools at which they are applying and, most importantly, to make their major choice prior to application. For UCLA applicants interested in a selective major, this means students would have to make this choice by November of their senior year of high school.

In general, the more selective the universities, the more restricted its major selection and major switching policies are. This makes intuitive sense as by definition demand outstrips supply at selective colleges. Admitted students may feel happy just to be admitted to some of these schools and, therefore, will put up with more restrictive policies. On the other hand, less selective schools may feel the need to be more friendly to the student – in terms as having more open major admission, transfer, and major switching policies – in order to attract new students and retain continuing students. For instance, Cal State Los Angeles (a member of the less selective California State University system) does not have any major specific requirements for entering freshmen. However, there are some major specific requirements for applying transfer students, which includes the numerous community college transfers that come to Cal State LA each year, that have been put into place for the fall 2018 semester and beyond.

Some universities, including the two very selective ones described here, require students to enter college without a declared major. At Caltech, students do not select a major until the end of their freshmen year, but are required to select one before the end of their third term. This is similar to the situation at MIT, where all students enter undeclared and remain so through the first year. Students are highly encouraged to select a major at the end of their freshmen year, but there is an option to remain an undeclared sophomore. No student can remain undeclared once they reach junior status. These prestigious universities have set their curriculum to encourage exploration of different subjects throughout freshmen year, but have a restricted time in which to make your major choice once the prescribed exploratory period is over.

The College of Arts and Sciences at Boston College has a very interesting policy regarding major selections. Incoming freshmen or freshmen in their first semester are allowed to declare a major as usual. However, all of these major choices are wiped from academic records at the start of the second semester on campus, officially rendering all students undeclared in that college. Then, these students re-choose (or initially choose) a major in consultation with their advisors.

21 The official policy can be found detailed at https://www.bc.edu/content/dam/files/offices/acadvctr/pdf/Choosing%20a%20Major%20in%20the%20College%20of%20Arts%20and%20Sciences.pdf as of March 25, 2018.
prior to spring break of their freshmen year, but are allowed to remain undeclared. Many students, some with a previously declared major, choose to remain undecided. Students are required to declare a major prior to registering for their fifth term.

This policy seems to accomplish a similar purpose to the “all students undeclared” policies at MIT and Caltech, so why bother with allowing students to declare a major in the first place? The idea of this policy seems to be that it allows students to declare a major as a freshman, which could help students avoid to the “stigma” of being undecided when talking to family and friends while not driving away those that are fully decided, while giving a “get out of jail free” to those students who may have feel pressured to making an early major choice, potentially by parents. This halfway house approach may also be forced because only one of the several schools and colleges within Boston College has adopted this approach. As long as students have to be able to sorted into different schools and colleges with different policy environments, some level of major choices needs to be allowed at enrollment. This displays the difficulty of lining up major selection policies across the largely siloed academic world, even at a relatively small private college.

University Programs

Based on the difficulty that many students have in choosing a major, any universities have created specific programs designed to help unsure students find a major that is a good fit for them. Several examples of each type of programs and exemplars of each type were selected for a detail review here.

Exploratory Programs

Before the advent of exploratory programs (and still at the universities that have not implemented one), students that had not decided on a major were simply undeclared and they were expected to eventually make their choice with little to no guidance. In an effort to provide support for these students, some schools have started exploratory programs that provide additional services for these students and, potentially more importantly, provide an equivalence of a sense of belonging that decided students have in their major programs.

The Ohio State University

Incoming students to Ohio State are spoiled for choice. They are asked to choose from a dizzying array of the more than 200 majors on offer at the university, from professional golf management to welding engineering to medieval and renaissance studies. With this massive starting choice set and admission criteria that can vary by major and college, it is no wonder that
a number\textsuperscript{22} of these students have a hard time figuring out what to declare prior to getting to campus. These deciding students are assigned to the University Exploration program if they do not declare prior to their freshmen year. Roughly twenty percent of each entering class takes part in this exploratory program at some point in their time at the university.\textsuperscript{23}

The exploratory program at Ohio State is an exemplar of programs from around the country, but perhaps operates at a larger scale due to the size of the university.\textsuperscript{24} The core of this program is the “EXP advisors”. There are currently 13 advisors that are specifically trained to deal with deciding students that are exploring their major options. Each deciding student is assigned an advisor that also teaches the mandatory University Survey course that covers policies, campus resources, and major exploration. This set up encourages additional student/advisor interactions outside of scheduled appointments. These advisors also have a partnership with the career counseling center along with the expertise to help students recognize the relationships between majors and careers.

The exploratory program at Ohio State has also created a “Senior and Recent Alumni Bank”, a directory of experienced students and recent alumni that have made themselves to be field questions from students in university exploration. The directory is searchable by students and includes filters for the major and minors of the participants. Students are encouraged to identify people that study in their areas of interest and then ask questions that they may have about the major, coursework, and career plans for after graduation. Students are also provided with a bit of guidance on questions to ask and etiquette for contacting people in the senior bank. Taking advantage of this self-directed peer mentorship program certainly takes some initiative that many incoming freshmen lack. In the earlier chapter that discussed influences on major selection, students with older siblings that were in college or recently in college seemed to be particularly well-informed. Deciding students could use this senior bank in a similar fashion to the way that these students used older siblings to gain “insider” information on their major options under consideration and potential careers.

The University Exploration program has also produced several resources that could be quite helpful to students exploring their major choices. For those students with a preference to self-advise (or, potentially, for advisors to use as a guide), the program created a comprehensive

\textsuperscript{22} About 20\% of each entering class participates in the University Exploration program according to http://exploration.osu.edu/ as of March 25, 2018
\textsuperscript{23} According to http://exploration.osu.edu/ as of March 25, 2018
\textsuperscript{24} Ohio State began the 2017-18 school year with an undergraduate enrollment of 45,946 students according to https://news.osu.edu/news/2017/09/15/ohio-state-freshman-class-is-brightest-class-in-university-history/ as of March 25, 2018
guide\textsuperscript{25} to course that can be used to explore different majors. Most majors have several potential exploratory classes listed and it has listed which of these courses could be counted towards general education requirements or is a required class for that major program if a student elects to declare in that area.

\textbf{Figure 8.1 – Frequently Asked Questions and Resources for Deciding Students at OSU}

Some other examples of resources produced by the program include succinct resource guide for 2\textsuperscript{nd} and 3\textsuperscript{rd} year students shown in Figure 8.1. These resource is designed for both undeclared students and those with majors that are exploring new options and includes some very targeted questions on areas where many students have interests but are often unable to qualify for the

\textsuperscript{25} The guide can be found at: http://exploration.osu.edu/Misc\%20documents/Courses_to_Explore_Majors.pdf as of March 25, 2018
academic standards, like health and business. There are also “What can I do with this OSU major?” one-page white papers for every major available that describe the nature of the academic field and its tie to careers. They go on to list common career areas and job titles for holders of degrees in each major along with a list of transferable skills and links to professional associations in each field. They have even produced a series of short YouTube videos that discuss exploring majors in different areas.

Ohio State has also begun offering meta-majors for exploratory students, a concept that will be profiled later in this chapter.

Meta-majors

Arizona State University

Meta-majors are exploratory pathways that allow major deciding students to explore different areas of interest in an organized or proscribed manner. These semi-structured course sequences are designed to provide a pathway to choose a major within a general area of interest. This is facilitated via a sequence that pairs gatekeeper courses (like math or foreign language) for the appropriate area with an exploration of the different sub-areas via classwork. These exploratory courses normally double as fulfillment of general education requirements. An exemplar of a meta-major program is the one at Arizona State University, which offers meta-majors as part of a broader exploratory program26 for students that enroll without a declared major. At Arizona State’s main campus in Tempe, the following meta-majors are available:

- Business Exploratory
- Education Exploratory
- Engineering Exploration
- Exploratory Health and Life Sciences
- Exploratory Humanities, Fine Arts, and Design
- Exploratory Math, Physical Sciences, Engineering, and Technology
- Exploratory Social and Behavior Sciences

Students in these programs are allowed to remain in these exploratory programs until they have accrued 45 credit hours, the equivalent of three semesters. All of the students with a meta-major take a one credit class each of these three semesters that involve career and major exploration. Other that these exploratory classes, each meta-major provides a closely suggested course load for each semester that allows for some limited freedom to choose the specific topic in each type of course. Some courses are marked as critical to the student, meaning that success in specific majors within the meta-major are predicted by the performance in that class. In other

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26 ASU also offered a career/major match tool on their website that involved repeatedly selecting one of two images that was most interesting to you. I used the tool and my top match was human behavior researcher! A 100% classification rate, albeit with a sample size of 1.
words, poor performance in a critical class might suggest that a student consider a major in a different field.

Most major deciding students have at least general area of interest in mind, so having students choose a meta-major is probably not too hard of a task, particularly because the categories are so general. These programs have the benefit of giving students a bit more of a direction than being generally undeclared and might be less “stigmatic” compared to telling friends in family that you are totally undecided. In general, the meta-major approach is probably not that much different than the outcome of a personalized schedule developed with input from a specialized exploratory advisor, but the more formalized nature and the aforementioned improve sense of direction could be a benefit over that approach. The identification of critical classes that predict future success is certainly an excellent feature of this particular meta-major program at Arizona State.

Statewide Policies

Florida College System, Meta-majors, and Math Pathways

While this analysis concentrates on four-year bachelor degree granting institutions, the state of Florida has enacted a policy27 at its community colleges that is worth mentioning here. All Florida community colleges were required to offer meta-majors that align with eight broad career areas. These meta-majors are largely designed to funnel students into the appropriate mathematics and English gateway coursework for each meta-major. For more technical meta-majors, this math coursework pathway may culminate in college algebra (largely seen as preparation for calculus, a requirement for most technical majors if a community college student is planning on transferring to a four-year degree program). For other areas, the pathway may finish with a math course that is considered less rigorous, such as quantitative reasoning or statistics. This realignment of math pathways with meta-majors ends up with students taking coursework that is potentially more relevant to their course of study. The meta-majors sacrifice total student freedom for a more prescriptive path with an idea that beginning math sequences as early as possible will help students complete college. However, these more defined paths may limit students’ future flexibility to change majors into new fields that were part of more rigorous meta-majors and math pathways.

STEM Major Advocacy and Workforce Alignment

As mentioned earlier in this dissertation, many states are doling out higher education funding to universities based on performance on a number of key performance indicators of student

27 Detailed in this memo from the Florida Department of Education:
http://www.fldoe.org/core/fileparse.php/3/urlt/JA-MemoMetaMajors.pdf as of April 1, 2018
outcomes. It is quite common for state to use graduation rates, time to degree measures, and intermediate progress to degree measures. In a few states, departments of education use student career outcomes like employment rates and starting salaries as part of the funding formula. Still in others, the number or percentage of credentials awarded in STEM fields (science, technology, engineering, and mathematics) or “areas of strategic emphasis” is included. This incentivizes colleges and universities in these states to grow the number of graduates in these fields and, in the case of states that use percentage of credentials, potentially do so at the expense of other fields that are not incentivized. It is thought that the future workforce needs for people trained in STEM disciplines will far outstrip the number of graduates from these fields and these initiatives are meant to grow the supply of these types of graduates.

There is a broad range of activities going on across the country driven by a broad range of stakeholders. This includes huge governmental agencies like the National Science Foundation, state departments of labor and education, private foundations, and individual universities. There are grants available for universities to recruit and retain STEM majoring students, scholarships for students seeking STEM majors, and numerous initiatives to attract more women, minorities, and low-income students (all traditionally underrepresented groups) into STEM majors at a higher rate.

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28 As reported by the National Council of State Legislatures. A full listing of current performance-based funding plans can be found at: http://www.ncsl.org/research/education/performance-funding.aspx as of April 1, 2018
Chapter Eight: Conclusion

This final chapter will review findings from previous chapters, provide some of the policy implications of this work, discuss areas for future research, and provide an overall conclusion to the dissertation.

Review of Findings

This section will present each research question as described in Chapter One and then describe the overarching findings from across the entire study.

Research Question One

- How do students choose their majors and what factors are important in a student’s choice of major field of study?

There is no one-size-fits-all process for how students go about choosing their major. The vast differences in personalities, information levels, and tastes and preferences makes the major decision process different for each student. Nevertheless, there are some common themes. Most students start by creating a reduced choice set through the elimination of options that are not good fits. It is often easier for the students to identify what they don’t want and more difficult to differentiate between a few attractive options. The creation of the reduced choice set allows to concentrate their information gathering efforts on just a few majors that have a more realistic chance of being chosen. Students are often afraid of making the commitment to declaring a major because it is viewed as a “lifetime” choice. When the choice is finally made, it is not due to a “lightbulb going on” moment, but rather the incremental building of confidence in an option under consideration. Once this confidence in a potential major choice passes a student’s personal threshold will they make a declaration.

Students report that there are several factors that are important in their choice. Students are concerned about careers that are associated with different majors, as many of them equate their choice of a college major with the choice of a lifetime career. Both working conditions and day-to-day responsibilities of associated careers are important to major deciding students. Job availability, both overall and geographically are also important to students. Pay levels associated with careers are also important to students to varying levels. Student’s knowledge of the pay levels associated with different majors was adequate in that most students were able to correctly relatively rank their major choices under consideration by associated pay levels. However, most students were poor at knowing the absolute levels of pay associated with each major.
Students were also concerned with course requirements for different majors, particularly math requirements. Some students eliminated options that they would otherwise be interested due to a requirement to eventually pass a calculus course.

Research Question Two

- Does the relative importance of these factors change for subsequent major choices?

As students persisted in college, they gathered improved information about majors, careers, and, perhaps most importantly, themselves from a variety of sources, including peers, professors, career opportunities, the internet, and their own course taking. Students are constantly re-evaluating their major choices and they use this updated information to do. Students reported switching their majors for three primary reason. First, some students switch because of a change in tastes and preferences. Students grow a lot as a person throughout their college career and sometimes interests that were present during a student’s senior year of high school just aren’t there by the time sophomore year in college comes around. However, this was not a frequently given reason for major switching.

The second reason for a major switch is that students will discover majors or subjects that they never knew existed. With the large number of majors available, it can be difficult for students to systematically review all of the options from the beginning or even know what some of the available majors entail. Students will sometimes find a major via peers or otherwise that they didn’t know was an option but fits their interests well and this will sometimes spur a switch to the newly found major. The last reason, and the most commonly reported reason by both students and advisors, is that students will switch majors due to poor academic performance. If students are not performing well in their major courses, particularly early on in course sequences, students realize that they will probably struggle with the more advanced classes on the way as well.

Research Question Three and Four

- How does the expected time to degree and the probability of graduation change with different initial major choices, including entering undecided, or changes in major?
- Are there different effects based on the timing of initial major selection, timing of major change, or the number of times a major is changed?

Different major choices do have statistically different average times to degrees, with engineering majors in particular taking longer than students in other majors to graduate. Major switching is a very common behavior. Major switching is associated with extended time to degree and excess credit taking, but the results from the quantitative analysis of the university data suggest that the timing of the last major change may be the key factor in time to degree, not just the frequency of major switching. Entering undecided does not have an association with
longer times to degree in the nationally representative data, but is associated with a small increase in time to degree in the university data. This effect is exacerbated if the undecided students waits until their sophomore year or later to make their initial major decision.

A single major switch was associated with a higher probability to graduate compared to students that never change their major, and switching majors multiple times did not have a significant relationship with the probability of graduation. Having lower previous term GPA, both term and cumulative, was associated with a higher probability of a major switch in the current semester. Participation in a major exploratory program, compared to entering undecided in a particular college and not receiving exploratory program benefits, was associated with fewer major switch and a lowered probability of making a costly late major switch on junior or senior status.

Policy Implications

This section will revisit the major policies in place as identified in the policy scan in the preceding chapter and describe the implications of my findings from the rest of the dissertation on these policies. True policy recommendations are not presented here, but this dissertation certainly adds context to the environment in which these policies are enacted.

First, exploratory programs are a good idea and there is a good argument for their services to be extended to students that have already declared their major as well. It is clear that all students have some level of uncertainty about their major choice, evidenced by the qualitative findings in this dissertation and the quantitative evidence of the prevalence of major switching. It would behoove universities to have all of their students explore potential majors during their first year, whether be via formal programs or just communication to use general education course requirements for this purpose. Whether or not it is ideal for a university to go as far as Caltech or MIT and require students to enter undecided, it remains to be seen. However, it is clear how this approach would allow all students to make initial major declarations with additional (and hopefully improved) information.

Nevertheless, any policies that encourage major exploration early in a college career would probably be most effective if they were paired with a requirement to make an initial major declaration in a timely manner (perhaps by the end of freshman year or the 3rd semester). The quantitative results suggest that waiting much longer than that could lead to a non-trivial extension in time to degree and additional costs. There is always a balance to providing students with freedom to choose their academic path with a more prescriptive approach, but students could potentially benefit from additional structure in their major decision making and course taking timelines.

As part of the exploratory process, it is important for students to start to reveal their academic ability in key prerequisite courses for their major early in their careers. Since academic performance in these courses is a major cause of major switches, delaying taking these courses
could push back potential major switches if a student performs badly and later major switches are more costly than earlier ones. Policies should be considered to not allow students to delay taking important gatekeeper courses, such as science or math courses that make or break whether a student can handle a particular major or not. Often times, there is a sequence of courses that need to be taken prior to reaching a terminal math class and it is important to start and continue the sequence as early as possible. At a minimum, students should be aware that delaying these sequences could have a significant effect on time to degree. It will give students early knowledge about their abilities and, if they perform poorly, will allow them time to rebuild their GPA if necessary.

Meta-majors could be a possible way to deal with some of these problems by providing a prescriptive path for major exploration in particular areas of interest. A meta-major might be a nice halfway house, but they could ultimately delay a student’s final declaration if they feel like they have already made a choice by selecting a meta-major. It might be best if meta-majors are paired with policies that restrict students to a certain number of semesters in which they can have a declared meta-major. After they reach that limit (perhaps two or three semesters), they would have to declare a full major. Meta-majors also are associated with certain “math pathways”, meaning that students in a humanities meta-major might start down or complete a path towards a non-calculus pathway that doesn’t include college algebra, for example. This might preclude the selection of a more technical major later, unless the student wants to complete another math course sequence. However, based on the qualitative results reported earlier, this may not be that big of an issue. At the time of potential major choice set creation, most students have very strong feelings about math requirements of different majors and often use this a key factor in selecting the majors to be in their choice set. It’s not that common for students to be considering majors with widely varying math requirements and, if they are, will likely be advised to proceed down the more technical math pathway to begin with.

This same concept of doing things that could be decisive in the major decision making process as early as possible carries over to career activities. It was very clear in the qualitative results of this report that career activities or field experiences of any kind in an area of interest helped students make up their mind, one way or another, about a major. Universities should do as much as they can to facilitate this types of activities, like internships, job shadows, or even just informational interviews with professionals in an area of interest. For example, students interested in education at the university studied in detail in this dissertation had time in the classroom in a field placement in the very first introductory course. This can be difficult to do at scale, but could be worth the investment as a recruiting tool and a way to help sort students into their final major. Even something as simple as a short low-credit survey course required for each major or department that introduces to potential career options associated with a major (and other peers in their major early on) could be fruitful for this purpose.

When it comes to the process of actually making a major change, a policy of a requirement to see an academic advisor to make a major switch make a lot of sense. At the university under
study in this dissertation, having this policy in place allows academic advisors to help students avoid costly major switches by running degree audits in the new majors under consideration and suggesting options that might meet the student’s but allow them to graduate in a timely manner. Most students have access to online degree audits and can see how their credits fit into a new degree program, but not all students have the capability to self-advise with competence.

Even before students report to an advisor to make a major switch, universities could attempt to identify students that were at risk for making a major switch. This research associates a lower GPA in the previous term with a higher probability of a major switch in the next term and this is probably a good place to start. Students with a GPA that doesn’t meet a particular threshold could be targeted with a more intrusive approach to advising that helps keeps these students on a path to timely graduation through more frequent meetings. This would be similar to approach taken by the advisors for intercollegiate athletes that was described earlier in this dissertation, which has a strong track record on keeping at-risk students making progress towards a degree. This approach would probably be useful beyond impacts on major selection. Although not covered in this dissertation, it is likely that GPA likely correlates with other outcomes of interest, particularly semester-to-semester persistence. The major challenge to that this type of intrusive advising approach is that it is resource intensive. However, since universities are being awarded portions of their funding based on performance on indicators like four and six-year graduation rates, an investment in additional advisement capability could be worth it if it helps makes significant improvement on those indicators.

This work has numerous implications for university-level policy, but it informs broader policy as well. In recent years, there has been an expansion of dual-credit programs, where students earn both high-school and college credit for a taken course, often times with no additional cost to the student over their traditional high school coursework. In Ohio, this program is called College Credit Plus and students can start taking dual credit courses as early as seventh grade. Depending on when students start taking dual credit courses and the intensity with which they take them, student could accrue enough credits to start college on junior status or earn an associate’s degree before leaving high school.

Even without these extreme behaviors, students want to use these credits to save money by reducing the number of semesters they need to pay for when they fully enroll in college. In order to fully take advantage of the opportunity to pay for fewer semesters, students are getting to the point where they need to start major-specific course sequences while still in high school. This will require students to choose majors even earlier than they already do now, at a time when the research presented in this dissertation says that most students haven’t even started thinking about it. Policy makers and dual-credit administrators need to take this reality into account by providing services and advisement to dual credit students (as many already do) make these decisions with good information and a warning to participants and parents that major specific course sequences may preclude a dual credit student from graduating as early as it might initially appear.
There are also ongoing efforts at the federal, state, and local level to encourage more students to study STEM fields in college in an effort to align skills in the labor force with the projected future workforce needs. Past work describing decision making in this area shows that students select STEM majors at the rate at which they are expected to, based on their academic preparation for the subjects. Past work has also shown that students switch out of STEM majors at high rates and switch into STEM majors at very low rates. This is often because the coursework is often very demanding in these subjects. Even talented students in these areas will often get better grades in non-STEM classes and, with worries about maintaining a high GPA (potentially for graduate school applications or maintaining scholarships), students can be tempted to switch out of these subjects. This is despite the fact that STEM majors are the highest return majors in terms of lifetime earnings offered at most universities. They should already be very attractive to students for this reason. This all suggests that efforts to attract a larger percentage of students to go into STEM majors should concentrate on K-12 academic preparation, rather than information campaigns to active major deciders. While these types of efforts could potentially be low-cost and effective, any marginal student swayed to select a STEM major will still have to perform in the major at a level high enough to not switch out to another major and ultimately graduate. If it is desirable to have more STEM majors, we need more students that are capable of academically performing in these subjects.

Areas for Future Research

There are several potential avenues for further research revealed by the research process for this dissertation that were beyond the scope of this work. The most obvious one is extend this methodology to students at additional universities, particularly those with different major selection policies, to be able to compare and contrast how the major decision making process of students is affected by different policy regimes. This work could be extended to look at those universities that have required all students to begin without declaring a major and examine major choice behaviors before and after the switch to that policy. Most of the work in this dissertation concentrated on data from graduates and all of it used data only from first-time full-time students. There is certainly room to extend this work to study the effects of major selection behaviors on students that did not graduate. Future work is also needed on the major selection process and major choice behaviors of non-traditional students, as there may be differential effects for these types of students.

Dual credit programs, while already fairly heavily studied, are also an area that is ripe for additional research from many angles, particular their effects on major selection and major selection’s effect on being able to realize savings with reduction of enrolled semesters. Are students in dual-credit programs less or more likely to select certain majors because of course sequencing issues that still make a student stay for four years even if they have accrued great deal of credits prior to college enrollment? If students do make a major declaration (or at least
take courses as if they had made a declaration) while they are still in high school, are they more likely to switch their major once they get on campus? Is it even appropriate for a student to declare their major (which is a major condition on future career choices) at that young of an age or enter the workforce after graduating at 19 years old? These, and many more questions, come to mind as areas that would be important for future research.

There are also opportunities for experimentation on a small scale regarding university policies. As was described earlier in the dissertation, it can be very hard to deal with selection bias when studying major decision making and student outcomes. One good way to do this would be to run randomized controlled experiments to examine the impacts of “treatments” on major decision making and student outcomes. Some examples of potential treatments would be information interventions or varying course requirements, advising approaches, or major selection policies that could be assigned to students randomly and varied between the randomly assigned groups.

Conclusion

This dissertation aimed to shed light on the college major decision making process in an effort to help students make better major choices the first time and to inform students and universities on the associations between major selection behaviors and student outcomes. University administrators and policy makers can use these findings to help design programs and interventions that will help major decision making students find the right major for them more quickly and avoid costly major selection behaviors as much as possible.
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Appendix A: Interview Protocols

Deciding Students Interview Protocol

1. Are you at least 18 years old?
2. Did any of your parents go to college?

Questions related to Initial Major Selection
3. As of right now, what are your top five potential major choices?
4. Why do you think you haven’t decided on a major yet?

Questions regarding sources of information
5. When did you begin to consider your potential choice of college major? Can you describe your consideration process from then until now?
6. What do you think are the most important factors that students should consider when making their major decisions?
   a. Are there any additional factors that you are personally considering while making your choice?
7. What sources of information did you use to help you make your major decision?
   a. Internet?
   b. Materials from the university?
8. Who have you consulted, if anyone, to provide advice on your major decision?
   a. Parents/relatives?
   b. Peers?
   c. High school?
9. When does a major deciding student first meet with an academic advisor?
   a. Is the student assigned to one advisor or a pool of advisors?
10. When you arrived for the first advising appointment, did you come in completely undecided or did you come in with a handful of majors in mind?
11. How often have you visited your pre-major advisor?
12. Have you taken the required Career & Life Planning course? If so, please describe the influence that it has had on your potential major choices.

13. How do potential career outcomes impact your major decision making process?
   a. Do you consider the potential financial returns of different potential majors?

   **General Closing Questions**

14. Do you think a student should choose their major prior to matriculation or wait until they have had some time on campus? Why?

15. What have been the biggest challenges that you have faced during your major decision making process?

16. What additional information or resources would help you make your major decision?

17. Is there anything else that you would like to share on this topic that we haven’t discussed?

**Major Switcher/Senior Focus Group Protocol**

1. Are you all at least 18 years old?

2. What is your current major and what major did you switch from? (ask everyone)
   a. Have you switched more than once? If so, what other majors have you had?

3. When did you begin to consider your potential choice of major? When did you declare your first major?

4. Describe your decision to change your major from your original choice?
   a. How/when/why?

5. How did the process of choosing your new major differ from how you chose your original major?

6. What sources of information did you use to help you make your major decision?
   a. Did those sources change from when you made your first major choice to your new major choice?

7. Who have you consulted, if anyone, to provide advice on your major decision?
a. Did the people you consulted with change from when you made your first major choice to your new major choice?

8. How do potential career outcomes impact your major decision making process?
   a. Do you consider the potential financial returns of different potential majors?

9. Do you think a student should choose their major prior to matriculation or wait until they have had some time on campus?

10. What have been the biggest challenges that you have faced during your major decision making process?

11. What additional information or resources would have helped you make your major decision?

12. Is there anything else that you would like to share on this topic that we haven’t discussed?

**Academic Advisor Interview Protocol**

1. What are your responsibilities with respect to student advisement? How long have you been in this role?

   **Questions related to Initial Major Selection**

1. Can you briefly describe what assistance you provide to students making their initial major decisions?

2. When does a major deciding student first meet with an academic advisor?
   a. Is the student assigned to one advisor or a pool of advisors?

3. When a deciding student arrives for the first advising appointment, how many students come in completely undecided versus how many come in with a handful of majors in mind?
   a. Does your advising approach differ between these two groups of students? If so, how does it differ?

4. What sort of information do you use to advise students in their initial college major decisions?
   a. Student specific information (e.g. HS GPA and academic background)
   b. Proprietary tools? (e.g. career fit tools)
   c. Is information used in the same way across all students?
5. What do you think are the most important factors that students should consider when making their initial major decisions?

6. What do factors do you think students ACTUALLY consider most important when making their initial major decisions?

7. What are the biggest challenges that you face in advising students making their initial major decision?

   Questions regarding Major Switching

8. Do you ever advise students that have selected a major and are considering a switch in majors?
   a. If no, where would a major switching student go for advising?

   (Skip questions if advisors never advise major switching students)

9. Can you briefly describe what assistance you provide to students considering or making a change in major?

10. In your experience, what are the primary factors that lead a student to switch their major?
    a. Academic performance?
    b. Classwork?
    c. Career concerns?
    d. Change in tastes and preferences?

11. Are there any institutional barriers to major switching? If so, can you please describe them?

12. If you advise both initial major choosers and major switchers, how does your advising differ between these two groups, if at all?
    a. Do you use the same information or is there additional information to draw on when advising major switchers?

13. How is the context of the major change considered when advising these students?
    a. Potential to derail graduation or extend degree
    b. Potential to raise probability of graduation (poor academic fit with original major)
    c. Serial major switching

14. What are the biggest challenges that you face in advising students switching their major?

   General Closing Questions

15. Do you think it should be more difficult for a student to change their major?
16. Do you think a student should choose their major prior to matriculation or wait until they have had some time on campus?

17. What additional resources would help you do your job better?
   a. Professional development?
   b. Better information?

18. Is there anything else that you would like to share on this topic that we haven’t discussed?