

COLLEGE ACADEMIC PROBATION:
AN EMPIRICAL TEST OF WHETHER THE “WAKE-UP CALL” IS WORKING

A Thesis

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by

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Abstract
of
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In recent years, colleges and university across the U.S. have taken strong measures to combat the issue of student departure. Yet, the number of students who depart from institutions of higher learning continues to grow. This poses a serious public policy issue as student departure carries with it several unintended socioeconomic consequences, such as a having a less-educated workforce, revenue loss to the institution, and a fruitless investment to the taxpayer for not seeing the payoff of a college graduate. The cannon of higher education research attributes student departure to a number of individual student characteristics and socioeconomic factors, and most recently has shed light to the institutional policies and barriers that contribute to student departure. The field however has widely ignored the influence of academic probation on student departure. Academic probation is a commonly used institutional policy that categorizes students who do not meet the institution’s academic standard as being on academic probation, during a given semester. The general belief is that academic probation serves as a “wake-up call”, intended to encourage and motivate students.

For some students however, this “wake-up call” can feel more like a signal that they do not belong at the institution and trigger their departure. Therefore, this thesis aims to contribute

to the limited academic research on academic probation, and more specifically on how academic probation influences student academic performance and student departure.

Using longitudinal student data sourced from California State University, Sacramento, for the years 2014-2018, I employ multiple Ordinary Least Squares and Logistic regression models to isolate the effect of academic probation. Moreover, I control for several socioeconomic and institutional factors that have shown to influence student departure. I also restrict data observations to students with a grade-point average (GPA) between 1.90 and 2.09, in a given semester. This allows for two comparison groups, those who earn a GPA that is slightly above the academic probation threshold (2.0) and slightly below.

This study does not find statistical significance between academic probation and students' grade-point average in the following semester after receiving academic probation. Furthermore, this study does find statistical significance between academic probation and student departure. Students who land on academic probation are almost twice as likely to leave the university in the following semester after landing on academic probation, than their peers in the control group who do not. Given these findings, I recommend colleges and universities examine how academic probation impacts their student departure rate and plan accordingly. Retention efforts aimed at students on academic probation, for instance, can help these students persist and ultimately reduce student departure.

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Date

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Chapter 1

INTRODUCTION

The issue of student departure from institutions of higher learning is among the most cited in the cannon of higher education research. While most published studies discuss individual student characteristics, academic aptitude, and student demographics, only recently has the field shifted the focus to institutional policies and barriers that contribute to student departure. This conversation however has generally overlooked academic probation as a potential trigger for student departure. Academic probation is a widely used institutional policy that categorizes students who do not meet the institution's standard grade-point average (GPA) during a given semesters; the minimum standard GPA at most institutions is a C average, or 2.0 on a 4.0 scale. Students who land on academic probation typically receive a notification from the institution regarding their probationary status. The general assumption is that academic probation serves as a "wake-up call", intended to motivate and encourage students back to good academic standing. Some research however finds that, at least for some students, withdrawal from the university happens as a consequence of academic probation, either in the form of voluntary departure, involuntary departure, or systemic departure (Tinto, 1987). By this process, academic probation can become a gateway to college departure for some students. Therefore, this thesis aims to explore the influence of academic probation on student departure at public four-year universities. Additionally, this study tests the assumption that academic probation serves as a motivating factor for students to improve their academic performance. I use longitudinal student data sourced from California State

University, Sacramento (Sacramento State), to conduct multiple regression analysis and determine the statistical significance between academic probation and academic performance and to tease out the effect of academic probation on student departure. This chapter introduces the concept of student departure in higher education, provides some context to academic probation as a driving force for student departure, and outlines the remaining chapters in my thesis.

Student Departure in Higher Education

Colleges and universities across the U.S. struggle with student departure; a concern that has challenged institutions of higher learning for over half a century. Yet, in contrast to the perception of the 1950's and 1960's, when many universities, especially those of high academic regard in the mainstream, welcomed a high dropout rate as a signal of academic competition, rigor, and status, most universities today are actively engaged in diminishing their student dropout rates (Barefoot, 2004). This is evident in the rise of student support programs and completion initiatives that are becoming the norm across the field. Despite these efforts, recent national data show that only 59% of first-time, full-time undergraduates at public four-year degree-granting institutions graduate within six years (National Center for Educational Statistics, 2016). This rate is significantly lower for less selective institutions. For public four-year universities that admit more than 90% of student applicants, the six-year graduation rate is 49% (National Center for Educational Statistics, 2016). While some students will continue their education after the six-year mark and eventually attain a degree, the National Student Clearinghouse (2017) finds that an estimated 24% of students at public four-year

universities will drop out entirely. That is nearly 2 million students leaving the university each year without attaining a degree (Hess, 2018). Additionally, student departure disproportionately impacts low-income and first-generation-to college students. The Pell Institute (2016) finds that students who identify as both low-income and first-generation-to college have the lowest six-year degree-completion rate at 31.5% and have significantly higher dropout rates than do affluent students with college educated parents. This same report found that 40.4% of low-income first-generation-to college students will depart the university before graduating.

The consequences of student departure can have far reaching social and economic implications. This is true for the individual student who departs, for the institution, and for society at large. The public, for instance, loses from the investment contributed through federal and state appropriations to student financial aid and public four-year universities. Institutions also lose; they waste resources, services, and lose out on potential revenue for every student who drops out. Moreover, few students who depart recoup their losses after withdrawing from the university. Although some students leave the university in better financial shape than when they started, for a majority of students who dropout, especially those of low socio-economic status, the cost of departure can be much more damaging. These students tend to suffer sunken costs, opportunity losses, lost investment, and in many cases, leave the university saddled with crippling student loan debt. The burden of these costs are much more noticeable when compared with the benefits associated with attaining a bachelor's degree.

College completion affords the potential for social upward mobility, higher earnings, and higher tax contribution. Americans with a bachelor's degree are more likely to vote, twice as likely to volunteer, and contribute almost four times more to charity than those without a degree (Association of Public & Land-Grant Universities, 2016).

Additionally, a number of studies have found that Americans with a bachelor's degree live longer, healthier, and happier lives than those without. One particular study found that 110,068 deaths in 2010 for adults that dropped out of college were preventable had they finished their degree (Krueger, et al., 2015). The challenge to public policy leaders, higher education administrators, practitioners, and constituents alike, is that far too many students leave the university without ever completing a degree. The following section further describes the costs of student departure and its impact on society, institution of higher learning, and the students who leave without completing a degree.

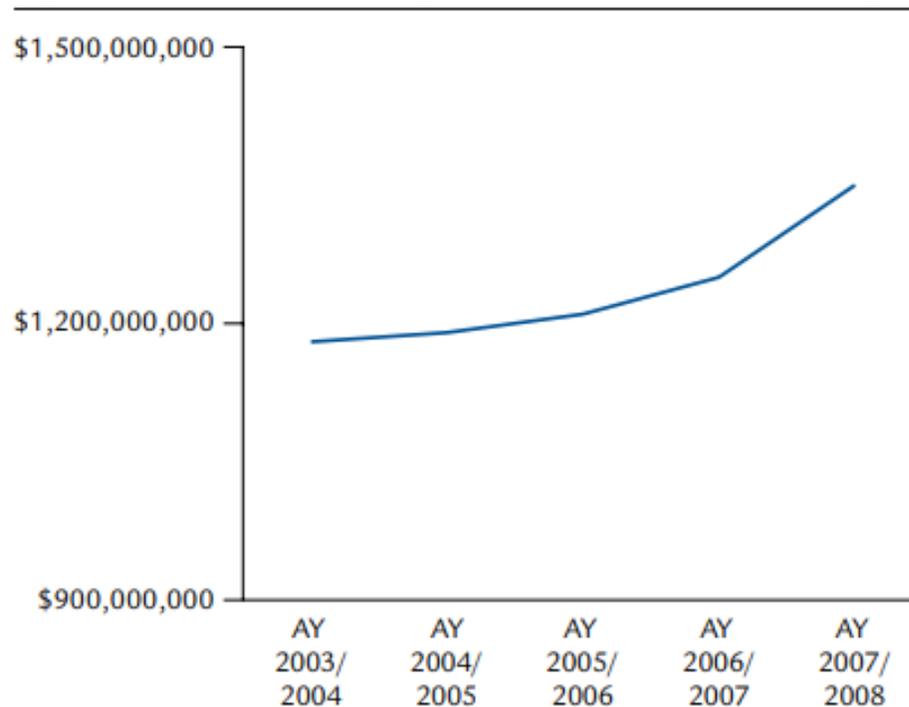
The Cost of Student Departure

Cost to Society

In, *Finishing the First Lap: The Cost of First-Year Student Attrition in America's Four-Year Colleges and Universities*, (2010) the American Institutes for Research reports that between 2003 and 2008 states appropriated almost \$6.2 billion to colleges and universities to help cover the tuition costs of students who dropped out their first year. The report also notes that during this same period, states and federal grant allocations for students that departed after their first year amounted to \$2.9 billion. Figure 1 shows these public tax dollars in sunk costs and lost investments. Lastly, the report found that California, the state with the most grant allocations, spent almost half a billion on

students that dropped out before the beginning of their second year. Yet, the cost of student departure to society is not only in dollars and cents: as mentioned earlier in this

Figure 1. State Losses Through Appropriations are Increasing



Source: Finishing the First Lap: The Cost of First-Year Student Attrition in America's Four-Year Colleges and Universities, American Institute for Research

paper, when students fail to complete a degree, they are less likely to reap the benefits of attaining a higher education, such as a stronger earning potential. Students that take out loans and dropout of college without completing a degree are more likely to default on their loans, have higher rates of unemployment, and earn less throughout their lives. This all carries various costs to society, such as spending more on unemployment security and losing on loan repayments. Particularly important to the State of California is the fact that a high college dropout rate means a less skilled and prepared workforce. The Public

Policy Institute of California (PPIC) predicts a skills gap of bachelor's degree in California by the year 2030 (PPIC, 2019). A less educated population is also associated with higher crime rates, less safe neighborhoods, and poor quality of health. The cost of departure to society therefore is not only monetary, but carries several negative social externalities as well.

Cost to the Institution

The cost to public four-year universities comes in spent resources, including funding for students who do not graduate and loss in potential revenues once the student leaves. A Retention Cost Calculator created by the Educational Policy Institute (2016) calculates that an institution like Virginia Commonwealth University, which holds a 62% graduation rate, will lose an estimated \$86 million in associated costs for students that depart within a six-year period. Another study by the American Institute for Research (2012) found that student departure accounts for 13% of all estimated expenditures for four-year public universities. These are sunk cost that the university will not see a return on. Additionally, universities with high dropout rates will suffer dwindling future student registration rates. A college education is a commodity like any other and adheres to the economic laws of supply and demand. Therefore, a college with low completion rates and high dropout rates may not have as many customers (students) as other college with high completion and low dropout rates.

Completion and dropout rates for public four-year universities are publicly available via institutional, state, and federal platforms, and are widely reported by news and information sources on an annual basis. This gives students and parents, the

consumers, the power to make informed decisions when selecting which campus to attend. As a result, universities with low completion rates and high departure rates could experience lower registration numbers. Considering the fact that universities are essentially businesses, a significant reduction in registration, or customers, could result in the university's shutdown. Therefore, the cost of student departure to the institution is a critical concern for the survival of the institution.

Cost to the Student

To begin, students who dropout of college lose out on the earning potential of attaining a college degree. The Bureau of Labor Statistics (2017) reports a median weekly salary of \$718 for full-time workers with only a high school diploma compared to a median weekly salary of \$1,189 for those with a bachelor's degree. That's almost twice the earning potential of the bachelor's degree. The Economic Policy Institute (2017) similarly describes this earning gap in Table 1. Note that although hourly wages grew slightly for workers without a college degree during 2007-2017, the hourly wage gap between less than high school, high school, and even some college, and those with a college degree remained significantly wide.

Table 1. Average Hourly Wages by Education, FH 2007-FH2017

	Less than high school	High school	Some college	College	Advanced degree
All					
<i>FH2007</i>	\$13.53	\$17.72	\$20.03	\$31.04	\$39.28
<i>FH2016</i>	\$13.30	\$17.53	\$19.50	\$32.46	\$41.45
<i>FH2017</i>	\$13.55	\$17.83	\$19.41	\$32.40	\$41.58
Annualized percent change					
<i>2016-2017</i>	1.9%	1.7%	-0.4%	-0.2%	0.3%
<i>2007-2017</i>	0.0%	0.1%	-0.3%	0.4%	0.6%

Source: EPI analysis of Current Population Survey Outgoing Rotation Group microdata

The cost incurred by students who dropout is not just in loss of potential income, but for many students, it can also come in sunk costs, or in other words, lost investment. Students invest their time and money in pursuing a degree. There is an inherent opportunity cost that students incur when making the decision to attend a university, rather than work or find some other productive use of their time. Further exacerbating these costs is the fact that many students who dropout leave the university with a substantial amount of student loan debt. The U.S. Department of Education's College Scorecard found that 3.9 million undergraduate students dropped out of college with federal student debt during the fiscal year 2015 and 2016. That's almost \$7,000 worth of debt for each student who drops out of a public four-year university (See Table 2), but the cost does not end there. A report by Third Way (2018), a center-left think tank, found that

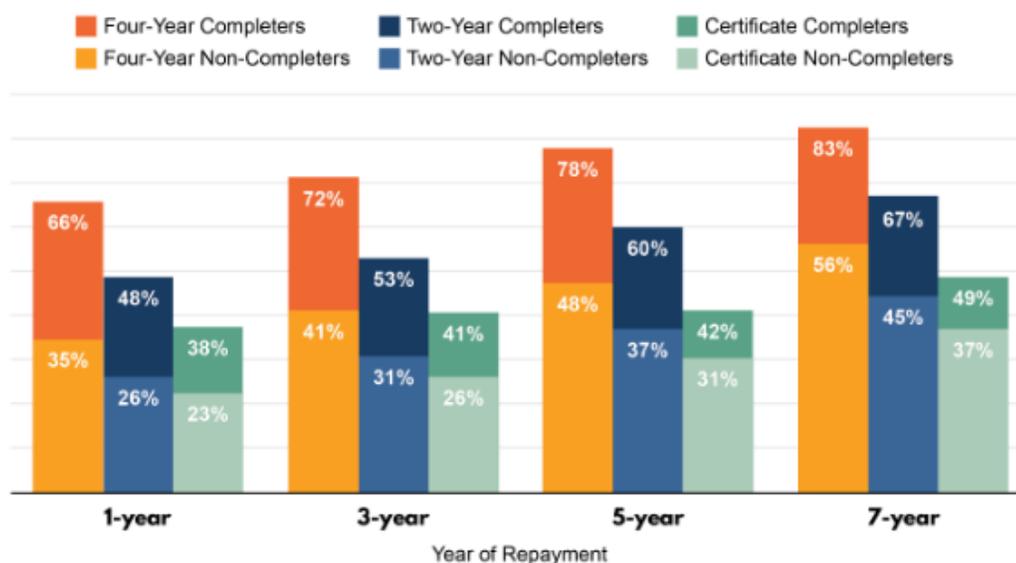
Table 2. College Debt and Students who Dropout

	Public (community colleges and four- year universities)	Private nonprofit colleges and universities	For-profit universities	Total (all types of institutions)
Undergraduate students who dropped out with debt during fiscal years 2015- 2016	2.5 million 64%	0.5 million 13%	0.9 million 23%	3.9 million 100%
Number of undergraduates (average, 2010- 2015)	6.7 million 64%	2.7 million 26%	1.1 million 10%	10.5 million 100%
Average debt of dropouts	\$6,871	\$9,668	\$5,812	\$7,174

Source: College Scorecard of U.S. Department of Education, National Center for Education Statistics

that four-year university students who completed college (completers) were almost twice as likely to start paying down their debt within the first year after graduation when compared to four-year university students who did not complete a degree (non-completers). After seven years of loan repayment, 87% of completers compared to only 56% of non-completers had paid off their student loan debt (see Figure 2). This can mean a number of things for students who leave the university with student loan debt and have difficulty repaying this debt or fail to repay it altogether. Particularly concerning is the possibility that students who dropout will struggle to pay their student debt and hurt their

Figure 2. Loan Repayment Rates at 4-Year, 2-Year, and Certificate-Granting Institutions



Source: Want More Students to Pay Down Their Loans? Help Them Graduate. Third Way

credit score. A poor credit score can have lasting effects on an individual such as creating barriers to purchase a vehicle, qualify for a mortgage loan, or even have difficulty qualifying to rent an apartment or house. It is well-established that these specific circumstances can significantly stymie a person's achievement and success.

Academic Probation as a Gateway to Student Departure

Most colleges and universities use a similar academic probation policy, by which students enter academic probation if they do not meet the GPA standard (typically 2.0 on a 4.0 weighted scale) during a given semester. Students who enter academic probation receive a notification regarding their status via mail, email, and or phone call. To regain good academic standing, students on academic probation must reach a cumulative GPA of 2.0 or above. A student who does not meet this academic standard after a set number of semesters is subject to disqualification or dismissal by the institution. While some

colleges dismiss students after their first sub-par semester, most practice a three strikes rule that affords students a warning after the first semester, a second (usually more serious) warning after the second consecutive semester, and are dismissed from the university after three consecutive semesters of substandard academic performance. A majority of universities see this process as a “wake-up call”, intended to encourage and motivate students to improve their academic performance. For some students however, academic probation can be a gateway to departure.

Few colleges and universities offer robust support programs and tailored counseling services for their students on academic probation. Some of these even have set requirements of engagement for students to regain good academic standing. Most institutions however only notify students of their probationary status and resources available to them. At Sacramento State University, the focus for my study, students on academic probation receive notification of their status and resources available to them, but are not required to access these services in order to come off academic probation. An argument favoring this system could be that the onus for overcoming academic probation is with the student and therefore it is the responsibility of the student to seek and access the resources. In the context of Sacramento State however, and institutions like it, where nearly 17% of students will be on academic probation at some point in their college career, the notion of having a more supportive and intrusive academic probation process seems sound. Moreover, it is in the interests of institutions of higher learning to analyze the impact that academic probation has on their retention measures.

At least once piece of research finds that nearly 25% of all college students will experience academic probation at some point in their college career (Cohen & Brawer, 2002; Garnett, 1990). Furthermore, Miller and Sonner (1996) report that only 13% of students on academic probation nationwide will complete a degree. That is a dismal number, especially considering that the national average six-year graduation rate stands at almost 60%. In other words, when compared to the average student, students on academic probation are nearly six-times less likely to graduate from college. By this count, a university with a 25% academic probation rate and a 13% graduation rate for students on academic probation is losing almost 22% of its students through the academic probation process. This is especially concerning given the fact that a disproportionate amount of these students are low-income and first-generation-to college, a demographic that is increasingly the focus of many universities. A Boise State study (2010) found that students who were both low-income and first-generation-to college had a higher risk of being on academic probation, and were more likely to drop out before the start of their second year. That is a significant loss to the institution and warrants attention to the underlying influence of academic probation on student departure.

Duty of the Institution

Nearly all four-year universities in the U.S. have some form of admissions process, albeit some more rigorous and competitive than others. Nonetheless, this process, usually involves a set of definitive criteria that signals the readiness, preparedness and potential for success of the student applicant. Students who are admitted to the university are selected because of this pre-determined belief that they will

be successful at the institution. The fact that students fail, even in the face of such a process, suggests that colleges and universities, to some extent, share in the burden of their students' failure. Put simply, when students land on academic probation and subsequently dropout of college, the university has failed. The university fails on the investment of the student, as well as on the investment of the public. Consequently, colleges and universities are not only morally obligated to supporting students on academic probation, but also financially.

Academic probation policies vary from institution to institution; some universities have robust support programs for student on academic probation, while a majority of institutions having nothing at all. Many institutions apply a relatively more punitive approach to dealing with students on academic probation. Students on academic probation are often restricted from participating in extracurricular activities, enrolling in electives, and are limited to a certain number of units per semester (Fletcher & Tokmouline, 2010). Other universities are more strategic in their efforts to improve the number of students who regain good academic standing after academic probation. The University of Southern California, for instance, requires students on academic probation to meet twice with an Academic Review Counselor in order to register for courses the following semester. Butler, Blake, Gonzalez, Heller, and Chang (2017) conducted a study on this process and analyzed the adapted *Appreciative Advising* framework to help support students on academic probation and assist them with regaining good academic standing. This study resulted in a significant decrease of involuntary departure (academic dismissal) for students on academic probation. Such results on academic probation policy

changes suggest that universities have a responsibility to their academic probation students.

As publicly funded institutions, public four-year universities are subject to the expectations of their tax-paying constituents. These constituents benefit from a more educated workforce and community, and experience negative externalities that results from student departure, such as higher crime rates and less healthy communities. The duty of four-year public universities therefore is to provide a quality education for their students and ensure these students have the necessary support to complete a degree. That is how public universities fulfill the return on investment to the tax payers that support them. Student departure, in some instances, comes as a consequence of being placed on academic probation. This is particularly the case for low-income and first-generation-to-college students, who experience academic probation and student departure at significantly higher rates. Understanding how academic probation influences student departure is critical to improving completion rates at public four-year universities. This thesis therefore seeks to find the relationship between academic probation and completion rates at a four-year public university.

Thesis Agenda

The remaining chapters in this thesis are as follows. Chapter 2 provides an overview of the literature related to academic probation and the influence it has on student departure. In Chapter 3, I discuss my research methodology, including data collection, variable factors, and regression analysis. Chapter 4 summarizes the results of my regression analysis and identifies the statistically significant relationship between

academic probation and student performance, and the effect that academic probation has on student departure. Finally, Chapter 5 is a conclusion of my findings and recommendations for university practitioners and administrators at Sacramento State University, and public four-year universities in general.

Chapter 2

LITERATURE REVIEW

While there is extensive literature that looks at the impact of institutional policies on student outcomes, research pertaining to the potential adverse effects of academic probation is relatively limited. Most available studies on academic probation focus primarily on strategies and programs that help students regain good academic status; few pieces of research examine the influence of academic probation on academic performance and student departure.

To better understand academic probation and the influence it has on student departure, I analyze three sets of research related to academic probation. The first covers elements of previous research that define and conceptualize academic probation by presenting common academic probation policies and highlighting the known factors that lead students to land on academic probation. The second theme targets the core question of this thesis by analyzing past studies that link academic probation to student outcomes, and specifically to student academic performance and departure. Lastly, in the third theme of this literature review I introduce institutional programs and organizational reforms that assist academic probation students to regain good academic status and discuss how practitioners adapt these strategically and successfully, particularly to help low-income and first-generation students. I conclude with a brief summary of the findings from this literature review and address the implications that these have on my own analysis of the effect of academic probation on student outcomes, and specifically on departure.

Contextual Background

Existing research on academic probation shows that college students land on academic probation at significant rates, with some accounts reporting the rate as high as 25% (Cohen & Brawer, 2002; Garnett, 1990). Although the issue of academic probation is prevalent in the field, it has not received enough attention in higher education research. Scarf (1957) and Smith and Winterbottom (1970) are examples of early research on student academic failure (academic probation). Their research did not address academic probation as a primary issue, but it did provide some early descriptions of academic probation as an academic process and therefore as an academic status. Like now, students in these early studies were placed on academic probation after they attained a grade point average that did not meet the institution's academic standard.

Most colleges and universities perceive academic probation as a corrective process by which students should “wake up” and do better academically in the following semester (Lindo, Sanders, and Oreopoulos, 2010). This attitude reflects the widely used academic probation institutional policy of simply notifying students of their status, without providing any support services. The belief is that the notification alone will serve as a signal for needed improvement in academic performance. Few universities offer and or require prescribed measures that assist students on academic probation to regain good academic status. These measures tend to vary from university to university and typically fall into two categories: corrective or developmental support services, and, punitive or restrictive policies. Support services for academic probation students can come in the form of academic advising, psychological counseling, skills development workshops,

peer-mentoring, among other student development efforts (Seirup & Rose, 2011).

Punitive policies for students on academic probation include, restricting the number of units taken per semester, restricting extracurricular activities, and limiting financial aid (Fletcher & Tokmouline, 2010).

Predictors of Academic Probation

Among the literature reviewed, some authors highlight a lack of academic preparedness (Earl, 1988; Tinto, 1993, Trombley, 2001), low motivation (Abelman & Molina, 2001; Tinto, 1993), and difficulty with managing time (Earl, 1998; Tinto 1993) as reasons for which students land on academic probation. In addition, students on academic probation tend to lack adequate study skills, note taking skills, and report higher rates of anxiety (Huston, 2006; Kamphoff, Huston, Amundsen, & Atwood, 2007; Tovar & Simon, 2006). Moreover, the literature points to certain circumstances that can lead to academic probation, such as personal issues (Trombley, 2001), procrastination, disorganization, and difficulty with concentration (Isaak, Graves, & Mayers, 2007), as well as the inability to balance school, work, and family responsibilities (Huston, 2006). Tinto (1975) also found that students were more susceptible to being on academic probation if they faced difficulty adapting and integrating to the college environment. When compared with students in good academic standing, students on academic probation tend to have a lower high school GPA, work more hours, have children, and express having more barriers to achievement in higher education (Holland, 2005; Isaak et al., 2007, Trombley, 2001).

Much of the literature reviewed connected many of these same social and psychological characteristics with students from low-income and or first-generation backgrounds. A study conducted by researchers at the University of California, Berkeley (2013), for instance, looked at student data from 1998-2011 and found that being low-income, first-generation-to college, international student, and identifying as an underrepresented minority were all strong predictors of being on academic probation in their first year. The key takeaway here is that there is a general consensus among researchers with regard to traits that are typically associated with students on academic probation.

A number of these same student characteristics, such as race and ethnicity, low-income status, and first-generation-to college, also correlate with lower college completion rates (National Center for Educational Statistics, 2017). This poses a challenge with isolating the effect of being on academic probation and student completion, since some of the student characteristics that are typically associated with students on academic probation are also predictors for low completion rates. Studies on the impact of academic probation have tried to control for this by using a regression discontinuity model to compare similarly lower performing students, with one group being on academic probation and one near the academic probation threshold, but not in academic probation. I present the findings from these studies further in this chapter.

Academic Probation and Student Departure

The issue of student departure is complex and multifaceted; students leave the institution for a number of reasons. Vincent Tinto's (1975, 1993) integral theory of

student integration (Figure 1) serves as a focal point for comprehending, analyzing, and theorizing about student departure. In it, Tinto (1975, 1993) attributes student departure to a number of student characteristics, including the student's unclear goals and or intentions, poor integration to the institution, and or failure to achieve at the academic standard. Tinto (1975, 1993) describes the departure paradox as fitting three main categories:

- voluntary departure, where the student chooses to withdraw from the institution;
- involuntary departure, where the student is dismissed, disqualified, or expelled from the institution; and
- systemic departure, where the student withdraws from all systems of higher education.

Given this framework of student departure, a student who decides to leave the university after receiving an academic probation notification, but before reaching academic dismissal, experiences voluntary departure. On the other hand, a student on academic probation who reaches academic dismissal after subsequent failed semesters experiences involuntary departure. Finally, a student on academic probation who either departs voluntarily or involuntarily and never returns to any system of higher education is described as experiencing systemic departure. It is important to note that some students may choose to depart the institution for non-academic reasons too, such as attaining a job or tending to family responsibilities.

Perry, Hladkyj, Pekrun, and Pelletier (2001) refer to student departure as a *paradox of failure*; the assumption, they explain, is that when students receive acceptance to a university, they have met certain admissions criteria meant to determine their skill-level, academic aptitude, and potential for success. When students fail, as with students on academic probation, it creates a paradox that is difficult to solve. It is important then to consider why students fail and who tends to fail in understanding the relationship between academic probation and student departure.

Academic Probation and Low-income & First-generation Students

College students fail to meet academic standards for a number of reasons; many of which are not necessarily connected to academic aptitude. For low-income, first-generation-to college, and underrepresented minorities, in particular, external factors such as race, ethnicity, income, and first-generation status have shown to weigh heavily on academic performance. While the number of minority students attending predominately white universities has risen steadily over the decades, national data shows a regressive trend in graduation rates, academic performance, and retention rates for these students (National Center for Educational Statistics, 2016). Non-Asian minority students attending predominately white colleges, for instance, are less likely to graduate in four years, have lower GPAs, and dropout at higher rates than their white counterparts. Not surprisingly, these same populations also disproportionately represent a majority of student on academic probation.

Smedley, Myers, and Harrell (1993) identify three sets of factors that are critical to how minority students adjust to college and succeed: (1) individual attributes, such as

academic readiness, intelligence, confidence, and social maturity; (2) the social and psychological pressures of being disproportionately impacted student at a predominately white institution or community; and (3) the strategies that disproportionately impacted students use to cope with internal and external stressors. These stressors include financial problems, family issues, and poor academic performance. Depending on how well students cope with these issues can influence the student's decision to persist or depart from the university.

Academic Probation and Student Outcomes

Colleges and universities place students who fail to meet their academic standards on academic probation. This experience of failure can have devastating and lasting effects for some students, such as leaving the university; this is particularly the case for low-income and first-generation-to college students, since they are more likely to receive subpar grades and have a higher chance of being on academic probation. Researchers at the University of California, San Diego, investigating the correlation between psychological distress and low grades, found that students on academic probation are likely to exert a poor sense of self and well-being (Nance, 2007). For these vulnerable students especially, the academic probation notification alone can trigger a decision to discontinue their education. Researchers at the University of California, Riverside (UCR) conducted a series of social experiments to determine the impact of failure on unhappy people. They found that for participants who described themselves as unhappy, informing them that they had "failed" a given task later resulted in impaired reading comprehension and difficulty with completing parts of the Graduate Record Exam (Lyubomirsky,

Boehm, Kasri, & Zehm, 2011). Similarly, academic probation signals to students that they have failed. The Nance (2007) and UCR study suggest accordingly that underperforming students, who also have a poor sense of well-being, are likely to experience impaired academic performance if they receive a notification of an academic probation status (or failure).

In, *When You Fail, You Feel Like a Failure: One Student's Experience of Academic Probation and an Academic Support Program*, researchers Isabelle Arcand and Raymond N. LeBlanc (2011) explore in-depth the lived experience of one undergraduate student on academic probation. Arcand and LeBlanc write that when Mark (student pseudonym), the student participant in this study, received notification of his academic probation status, this experience took a toll on him and diminished his confidence. There is relevant research concerning the psychological and emotional effects of stressful experiences tied to failure (Lyubomirsky, Boehm, Kasri, and Zehm, 2011), such as what Mark experienced when he received notification of his academic status. One theory of particular relevance is that of the self-fulfilling prophesy (Merton, 1948). This theory describes the false assumption that a person makes in reaction to certain signaling circumstances or experiences. Furthermore, this perceived realization or confirmation of a pre-determined belief noticeably influences the person's behavior by further confirming or aligning with the assumed belief.

Researchers at Stanford University have found that by simply changing the harsh tone of their academic probation letters, they could potentially breakdown some of the barriers to success for students on academic probation (Chipman, 2016). The study

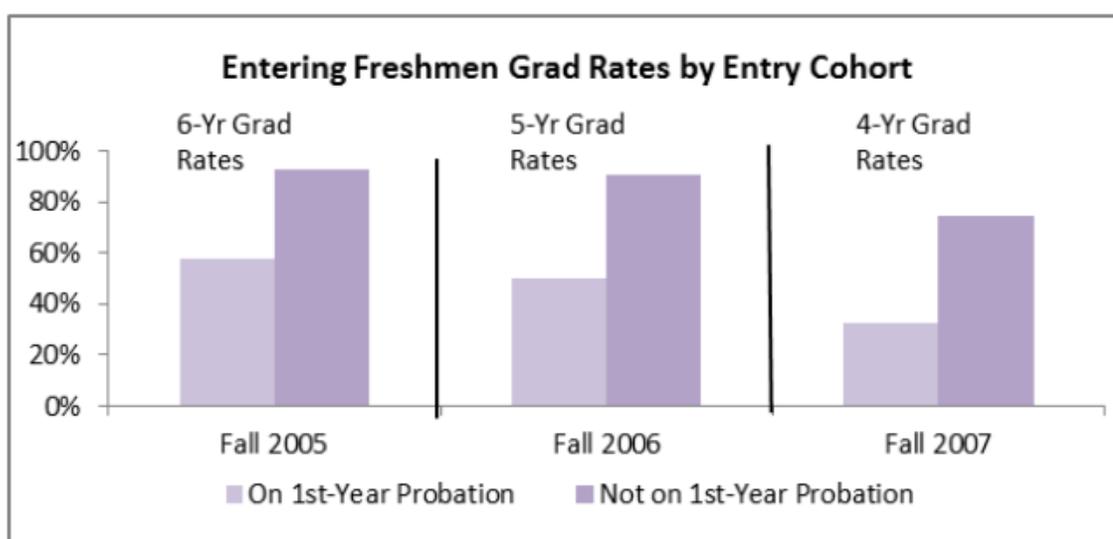
randomly assigned students into two groups: those who receive either the revised academic probation letter and those who receive the original academic probation letter and then compared attitudes and behavior between students in the two groups. Students that received the revised letter reached out for help more quickly and at higher rates. These students also showed significantly lower feelings of shame and embarrassment than students who received the original letter. The findings in this study suggest that an academic probation notification alone, especially one that uses the more typical negatively charged language, can be detrimental to student success. A similar study conducted by Fletcher and Tokmouline (2010) analyzed the effect of receiving notification of academic probation (either via letter or email) or not receiving any notification at four Texas universities. They found no significant long-term gains for students who receive an academic probation notification either via mail or email when compared with similar students who did not receive a notification. Both the Stanford and Texas studies suggest that students on academic probation need more support from the institution than a simple notification. In short, the “wake up” call is not working.

Reported Outcomes for Students on Academic Probation

Most available studies that reports outcomes for students on academic probation are exploratory in nature and provide only descriptive data, such as completion rates for students placed on academic probation. Researchers at the University of California, Berkeley (2013), for instance, analyzed student data from fall 2005 through fall 2013 and found that students who were placed on academic probation in their first year graduated at significantly lower rates than non-academic probation students. The gap between these

two groups was most drastic when comparing five-year graduation rates. While 91% of the fall 2006 entering freshmen not on academic probation their first year graduated within five years, only 50% of their cohort peers who ended on academic probation their first year did the same. These disparate outcomes are shown in Figure 3 below.

Figure 3.

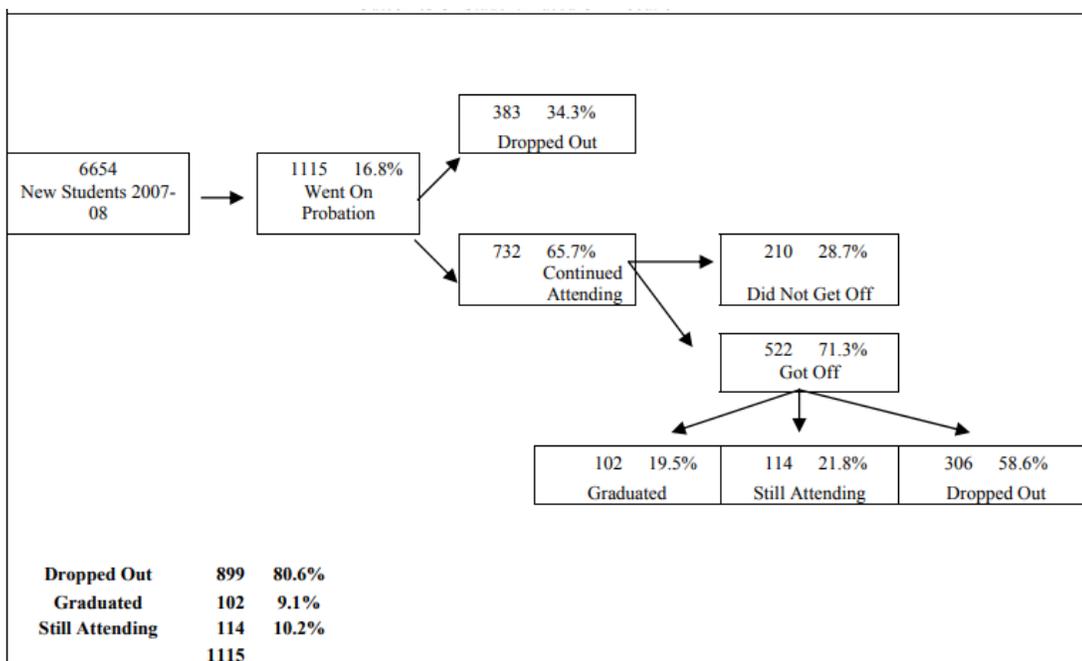


Source: Office of Planning and Analysis. University of California, Berkeley.

A similar study by researchers out of The University of Georgia (2006) looked at student data from a large, research-intensive public university in the south east. They examined student demographics and financial characteristics for students entering in fall 1999 through 2006. This study found that students who were ever on academic probation had a 20% higher risk of leaving the university before the end of their first year than their non-probation peers. This risk grows to 30% after the 2nd and 3rd years. Lastly, only 5% of students who are ever on academic probation graduate within four years, compared to 50% of non-probation students. Moreover, research at LaGuardia Community College

(2012) discovered even more dismal outcomes for their students entering the academic year of 2007-2008. Of the 6654 students that entered this year, 1115 went on academic probation, and only 9.1% of these students eventually graduated. That is an 80% rate of departure for students that entered academic probation. This transgression of departure is depicted in Figure 4 below.

Figure 4. Outcomes of Student Placed on Probation



Source: Office of Institutional Research and Assessment. LaGuardia Community College.

While the aforementioned studies provide important descriptive statistics for students on academic probation, they do not isolate the effects of being on academic probation. They do however highlight the need to better understand academic probation policies and the effect these may have on academic probation students. The few studies that specifically isolate the effects of academic probation through statistical analysis are discussed below.

Isolating the Effect of Academic Probation

Isolating the effect of academic probation is difficult because of the nature of academic probation. Academic probation is technically the failure to meet academic standards. In other words, students on academic probation are performing poorly academically. Most institutions of higher learning require that their students meet academic standards in order to complete a degree and graduate. Therefore, a student on academic probation, by the very nature of the status, is not eligible for completion. This heterogeneity between poor academic performance and academic probation can distort findings aimed at isolating the effect of academic probation. Nonetheless, at least three studies have successfully isolated the effects of academic probation on student outcomes by using various regression models to control for heterogeneity between factors. Additionally, two of the studies discussed below use a regression discontinuity model to separate high achieving students from lower achieving students and allow for a more appropriate control groups. Students that perform slightly below the academic probation threshold are placed in one group (academic probation group) and are compared with students that perform slightly above the academic probation threshold (non-academic probation group). This model successfully isolates the effect of being placed on academic probation because it targets students within a similar GPA range and when controlling for all other factors, assumes that the difference in their outcome is linked to the academic probation status.

Findings from these studies remain mostly mixed; while there is a general consensus that, at least for some students, being placed on academic probation negatively

affects their rate of completion, academic probation can also improve graduation rates for others. Lindo, Sanders, and Oreopoulos (2010), for example, analyzed data from a large Canadian university using regression discontinuity to measure the students' responses to being placed on academic probation. They find that although academic probation pushes some students out of the university, it motivates others to stay and achieve. Therefore, they conclude that setting a performance standard, such as academic probation, might serve as a process to "weed out" students who are not capable of achieving at the college level and help motivate those who can. Similar findings from a study in the Netherlands which compared universities with academic dismissal (academic probation) policies and those without reported that, on average, institutions that implemented academic dismissal policies had higher first year dropout rates and higher graduation rates than those that did not (Sneyers & De Witte, 2014). This support the notion that academic probation policies can have an adverse effect for students that leave the institution, but serve as a benefit to those that persists.

Lastly, at least one study has found no significant effect, either positive or negative, of academic probation on student completion. Fletcher and Tokmouline (2010) conducted a study using a regression discontinuity design to analyze student data from four large public universities. This study sought to measure the effects of being placed on academic probation, specifically looking at changes in GPA and completion rates. Results from this study support the general notion that academic probation policies serve as a "wake up" call for struggling students. Fletcher and Tokmouline (2010) found that students who were placed on academic probation experience a higher GPA in the

following semester by 0.1-0.2 points. This immediate GPA “boost” fades over time however; graduation and persistence rates were the same for student that were placed on academic probation their first year in college and students who also performed poorly, but did not meet the academic probation threshold. Overall, this study did not find a significant effect of academic probation policies on student outcomes.

Institutional Support for Students on Academic Probation

Some researchers believe that the institution has a moral and fiscal responsibility to ensure that all admitted students succeed, including students on academic probation (McGrath & Burd, 2012). In light of these obligations, many institutions of higher learning have implemented intervention programs and structures designed to help students on academic probation regain good academic standing. These efforts intend to decrease the number of students formally dismissed by the college or choose to discontinue their education (Tovar & Simon, 2006).

One intervention method is the incorporation of an academic probation seminar or course. These courses often resemble success courses like those offered to first-year and freshman students as a way to help students successfully transition from high school to college. The course curriculum tends to focus on student development, social and academic integration, and the development of study strategies (McGarth & Burd, 2012). Some success courses have shown promise in improving retention rates, increasing grade point average, and supporting student motivation (Barefoot, Warnock, Dickinson, Richardson, & Roberts, 1998). McGrath and Burd (2012) studied a mandated success course for freshmen placed on academic probation at a large, public university. The

course focused on student development, test-taking and note-taking skills, campus policies and procedures, major exploration, and actively engaged students with advisors, faculty, and campus resources. McGrath and Burd found that students who took the course showed higher persistence rates, grade point average, and graduation rates than did academic probation students who did not take the course. Although this course was set as an intervention for students on academic program, rather than a preparation course that is typical of success courses, it was adapted to address the challenges that students on academic probation tend to face.

Support for Low-income & First Generation Student on Academic Probation

Low-income and first-generation students that participate in a tailored academic probation course also show promising results. Ingham and McShane (1998) studied an Academic Skills Seminar at a four-year university, designed for students on academic probation. This was a mandatory course for all first-time probationary students. The students in this study tended to be low-income and or first generation. The course curriculum focused on goal setting, building study skills, improving time management, and lowering stress. In addition, the program incorporated a number of best practices and theories associated with the success of low-income and first-generation students. Ingham and McShane (1998) found an 8.4% increase in the persistence rate among freshman on academic probation after the implementation of the seminar. Furthermore, for students that passed the seminar, their persistence rate increased by 11.5%, when compared with non-seminar rates. These findings suggest that students on academic probation, and in

particular low-income and first-generation students, can, when provided with the adequate and prescribed guidance, succeed beyond academic probation.

Concluding Summary

Existing literature on academic probation is focuses primarily on programs and effective practices that support academic probation students in regaining good academic status. Few studies analyze the influence that academic probation policies have on student outcomes, and more specifically on student academic performance and departure. Though limited, studies on academic probation that emphasize student outcomes share some similar findings. In general, students who identify as low-income, first-generation-to college, or an underrepresented minority are at higher risks of being placed on academic probation at some point in their college career. Students that enter academic probation, especially during the first year of college, tend to have lower rates of completion and are statistically more likely to leave the university before the start of their second year. One study found that, at least for some students, academic probation can serve as a “wake-up” call and improves academic performance in the following semester, but this effect is short-lived and does not influence the rate of graduation when compared with similarly performing students who do not meet the academic probation threshold. The notion that academic probation serves as “weeding out” process was evident through most of the literature reviewed. This could explain the difference in student experiences and outcomes. At least one piece of research found that being placed on academic probation did not have a significant effect on student outcomes, either positive or negative. These findings point to the need for more substantial research on academic

probation, and specifically on how academic probation policies impact student outcomes. It is also important to consider that although the available research remains mixed, there are some common themes among the studies reviewed. Academic probation, for instance, disproportionately impacts certain students, such as low-income and first-generation-to-college. Also, although one piece of research found an insignificant effect of academic probation on student outcomes, a majority of the studies reviewed, find that being placed on academic probation has a detrimental effect for some students. The following chapter explains the methodology used in my study.

Chapter 3

METHODOLOGY

The purpose of this study is to isolate the influence of academic probation on student outcomes, and in particular on student academic performance and student departure at a large four-year public university. In this chapter, I provide an overview of the data used; I explain the statistical analysis and theoretical framework employed, and provide a brief description of the variables. Additionally, I discuss why I chose to exclude certain data from the regression analysis. Lastly, I present the regression models used and discuss why these models are appropriate.

Data Source

This study uses four years (2014-2018) of longitudinal administrative data sourced from the Department of Student Success Initiatives, a division of the Office of Academic Affairs at California State University, Sacramento (Sacramento State). Sacramento State is a large, relatively diverse public four-year university, with a 71.9% first-year acceptance rate. An estimated 30% of students at Sacramento State identify as first-generation to college and 31% report as low-income (Sacramento State, 2019). Sacramento State uses an academic semester system; for this data set in particular, each observation is either a fall or spring semester (summer not included). The university records 21 consecutive semesters per student, beginning with the student's initial entering semester (term 1) and ending with term 21 (last recorded semester). These semester observations are maintained irrespective of graduation or departure date, however because this data set only measures four consecutive years (2014-2018), the number or

terms elapsed for any given student is dependent on their entering fall cohort, with possible number of terms elapsed between 1 and 8. The data set includes background and academic information for all first-time in college students who entered the university as native first-year freshmen in a fall semester cohort between fall 2014 and fall 2018. In accordance with the literature reviewed, I organize all data points into institutional, student, and socioeconomic variables. These variables control for outside factors and strengthen the effect of academic probation on the dependent variables: change in GPA in the semester following academic probation (*GPACHange*) and failing to enroll in the semester following academic probation (*DropoutNextSemDummy*).

Sacramento State quantifies student GPAs after the end of every semester and places students on academic probation if they receive below a 2.0 GPA. The university notifies students of their academic probation status soon after. In an attempt to strengthen the accuracy and validity of this study, I restrict data observations to students that attain a GPA between 1.9-1.99 and 2.09-2.099, in a given semester. This isolates two comparison groups, those who earn a GPA that is slightly above the academic probation threshold (2.0) and slightly below. The logic in this method is that an appropriate counterfactual for a student on academic probation who earns a 1.9 GPA is a student not on academic probation who earns a 2.01 GPA (Lindo, Sanders & Oreopolous, 2008). In doing so, I create a cross sectional data set that analyzes a population (students) at a particular point in time (receiving academic probation). This allows for a total of 1528 student observations; each observation represents one semester; each semester observation includes a number of variables, including the two dependent variables: change in GPA in

the semester following academic probation (*GPACChange*) and failing to enroll in the semester following academic probation (*DropoutNextSemDummy*).

Regression Analysis

I use Ordinary Least Squares (OLS) regression models, commonly known as linear regression models, to test the isolated effect of academic probation on GPA (+/-) in the following semester after receiving academic probation. I do this to test the assumption that academic probation serves as a “wake-up call” for students and therefore is an institutional policy meant to improve students’ GPAs in the following semester.

Additionally, I use Logistic regression models to test the effect of academic probation on student departure from the university in the following semester after receiving academic probation. Like the studies conducted by Fletcher & Tokmouline (2010) and Lindo, Sanders, & Oreopolous (2008), this study creates two comparison groups: one group that is slightly below (GPA of 1.90 to 1.99) the academic probation threshold (GPA of 2.0) and another group that is slightly above the academic probation threshold (GPA of 2.0 to 2.1). This framework is appropriate for this study because of the assumption that two students within a tight GPA range, clustered around the GPA cutoff for probation, will fare similarly through their college experience and therefore attain similar outcomes.

Variables

After analyzing the literature, it is evident that there exist three main sets of factors that influence the departure rate for students at public four-year universities: institutional factors, student factors, and socioeconomic factors. As such, I group the variables in this study accordingly.

Dependent Variables

I analyze the effect of academic probation on two dependent variables: 1. *GPACHange*, the change in GPA (positive or negative) in the following semester after landing on academic probation, and 2. *DropoutNextSemDummy*, a student not enrolling in the following semester after landing on academic probation.

Key Explanatory Variable

The key explanatory variable in this study is *GPA1.9_1.99Dummy* (GPA between 1.9 and 1.99), which in accordance to Sacramento State's academic policy, signals that a student is on academic probation during a given semester. This variable measures the first instance in which a student receives academic probation.

Institutional Factors

As mentioned in the literature reviewed, institutional factors impact the student dropout rate (Tinto 1975, 1993). I try to control for this by grouping certain institutional variables and imputing these in the regression analysis. Included in this set of variables is student participation in a first-year seminar. Sacramento State offers first-time in college first-year students the opportunity to enroll in a three-unit course that introduces them college and provides various strategies for success. I also control for living circumstances by adding a living off campus variable. In addition, I include a variable for participation in the Educational Opportunity Program (EOP). EOP is a support services program at Sacramento State that primarily serves low-income and first-generation students. Lastly, this set of institutional factors includes the number of terms elapsed until the student landed on academic probation, class level (freshman – senior), and college enrolled-in

(i.e. College of Education, College of Arts and Letters, College of Business Administration, etc.).

Student Factors

Some of the strongest predictors of student departure in the literature reviewed are student characteristics, such as academic aptitude and ethnicity. I control for these by including a set of variables that represent various student factors. I include high school GPA and SAT Math and Verbal scores to measure the academic readiness of students. One study found higher rates of academic probation for foreign students; a foreign student variable is included in this data set. Lastly, the literature reviewed mentions that minority students tend to be on academic probation at disproportionate rates. Thus, this study also includes variables that control for race and ethnicity.

Socioeconomic Factors

The literature reviewed also points to socioeconomic factors that are strongly associated with student departure. Many of the studies discussed in the literature review found a strong correlation between lower graduation rates and students identifying as low-income and first generation. To control for socioeconomic status, I add a Pell Grant eligibility variable. Students who receive a Pell Grant meet the low-income federal guidelines. I also add a first-generation to college variable; this variable considers only students whose parents did not complete a bachelor's degree. Lastly, a variable for participation in the Educational Opportunity Program (EOP) reinforces control for low-income status because participation in EOP requires low-income status verification.

I list and describe all of the variables in Table 3. Additionally, the expected effect of each of these variables is presented as a positive (+) or negative (-) effect. I reference these expected effects in the hypothesis section of this chapter. The following section describes the model specifications of my study.

Table 3. Variable Description and Expected Effect

Variable Name	Description	Expected Effect	
		GPA Change	Drop Next
Dependent Variables			
GPACHange	Change in GPA (+/-) following semester after AP		
DropoutNextSemDummy	Student dropout the following semester after AP		
Institutional Factors			
TermsElapsed	Term in student's time at Sac State (terms 1-8)	+	-
Cohort14Dummy	Cohort entering term: Fall 2014	?	?
Cohort15Dummy	Cohort entering term: Fall 2015	?	?
Cohort16Dummy	Cohort entering term: Fall 2016	?	?
CollegeALSDummy	College of Arts and Letters	+	+
CollegeCBADummy	College of Business Administration	+	-
CollegeECSDummy	College of Engineering and Computer Science	-	-
CollegeEDDummy	College of Education	+	+
CollegeNSMDummy	College of Natural Science and Mathematics	-	-
CollegeSSISDummy	College of Social Science and Interdisciplinary Studies	+	+
CollegeUNDummy	Undecided Major	-	-
FreshmanDummy	Freshman standing in college	-	-
SophomoreDummy	Sophomore standing in college	-	+
JuniorDummy	Junior standing in college	+	+
OffCampusFirstSemDummy	Off-campus living in the first semester	-	-
FroshSeminarDummy	Enrolled in First-Year Seminar	+	+
FroshSemiEOPDummy	Enrolled in First-Year Seminar through Equal Opportunity Program	+	+
FroshSemiLCOMDummy	Enrolled in First-Year Seminar through Learning Community	+	+
FroshSemiGPA19_199Dummy	Interaction variable between Enrolled in First-Year Seminar and Semester GPA range 1.9-1.99	+	+

Student Factors			
GPA19_199Dummy	Semester GPA range 1.9-1.99	-	-
AfAmDummy	Self-reported African American	+	-
AsianDummy	Self-reported Asian	+	+
ForeignDummy	Self-reported Foreign	-	-
HispanicDummy	Self-reported Hispanic	-	-
MultiEthnicDummy	Self-reported Multiethnic	-	-
NatAmDummy	Self-reported Native American	-	-
PacificIslanderDummy	Self-reported Pacific Islander	?	?
UnknownDummy	Unknown Ethnicity	?	?
FemaleDummy	Self-reported Female	-	+
EnlishRemedialDummy	Enrolled in Remedial English Course first semester	-	-
MathRemedialDummy	Enrolled in Remedial Math Course first semester	-	-
EngMathRemedialDummy	Enrolled in Remedial English and Math first semester	-	-
HighSchoolGPA	Cumulative High School GPA	+	+
SATMathScore	SAT Math Score	+	+
SATVerbalScore	SAT Verbal Score	+	+
PublicSchoolDummy	Graduate of Public High School	?	?
OutOfStateHSDummy	Graduate of Out-of-State High School	?	?
OtherCAHSDummy	Graduate of Other California High School (Not Private or Public)	?	?
LatinxGPA19_199Dummy	Interaction variable between Self-reported Hispanic and Semester GPA range 1.9-1.99	-	-
AfAmGPA19_199Dummy	Interaction variable between Self-reported African American and Semester GPA range 1.9-1.99	-	-
PublicSchGPA19_199Dummy	Interaction variable between Graduate of Public High School and Semester GPA range 1.9-1.99	-	-
Socioeconomic Factors			
EOPDummy	Participant in Educational Opportunity Program	-	+
PellEligibleDummy	Pell Grant eligibility upon entry	-	+
FirstGenDummy	Self-reported First Generation to College	-	-
FirstGenUnknownDummy	Unknown First Generation to College Status	?	?
EOPGPA19_199Dummy	Interaction variable between Participant in Educational Opportunity Program and Semester GPA range 1.9-1.99	-	-
PellGPA19_199Dummy	Interaction variable between Pell Grant eligibility upon entry and Semester GPA range 1.9-1.99	-	-
FirstGenGPA19_199Dummy	Interaction variable between Self-reported First Generation to College and Semester GPA range 1.9-1.99	-	-

Model Specification

Ordinary Least Squares (OLS)

OLS regression, or linear regression, is a statistical method used to determine the relationship between a dependent and explanatory variable, holding other explanatory variables constant. Linear regression fits a line to the observed data that predicts the effect of the explanatory variable on the dependent variable. Adding other causal variables to the regression, that theoretically influence the dependent variables, increase the likelihood that detected influence of one explanatory is causal and not just correlational. Linear regression is an appropriate statistical tool when analyzing a continuous dependent variable such as GPA change. Therefore, I use OLS regression models to test the influence of being on academic probation (a dummy variable set equal to one if on probation, and zero if not) on GPA change in the following semester (dependent variable). In accordance with findings in the literature reviewed, I put forth three sets of broad causal factors that are expected to influence GPA change. These are institutional factors, student demographic factors, and student socioeconomic factors.

Logistic

A logistic regression also fits a line to the observed data, but does this to determine the effect of an explanatory variable on a dichotomous dependent variable, that is a variable that has one of two outcome. An example of this is a coin that is flipped a number of times; the outcome of each coin flip is either heads or tails, nothing else. Such observations can be statistically analyzed by converting them into a numeric value and

creating what is known as a dummy variable for each outcome; this dummy variable is typically a 1 (heads) or 0 (tails).

In this study, the dependent variable, *DropoutNextSemDummy*, is dummy coded to represent a 1 for students who did not enroll in the following semester after receiving academic probation and a 0 for students who did enroll. Unlike a linear regression model that fits a straight line along the x and y axis, the logistic regression model fits an “S” shaped line that depicts observations that fall either on a 1 or 0, creating a probability of outcomes model.

A logistic regression generates an odds ratio and p-value for each variable in the model. The odds ratio tells the “story” of the regression by interpreting the relationship between the dependent variable and reference variable (Population Survey Analysis, n.d.). Moreover, the odds ratio represents the impact probability of the reference variable on the dependent variable. The p-value, set at ≤ 0.10 in this study, measures the statistical significance of the variable in the regression analysis by quantifying the probability that the measured outcome occurs by chance. If there is less than a 10% (≤ 0.10) chance that the outcome in the regression is due to randomness, then the variable effect is statistically significant and the null hypothesis is rejected. An example of how to read the odds ratio is, given a variable’s odds ratio, say *FirstGenDummy* has an odds ratio of 1.5 and is statistically significant at p-value of ≤ 0.10 , the relationship between the variables is interpreted as: *first- generation students who land on academic probation are one and a half times less likely to enroll in the following semester*. The logistic model serves the purpose of this aspect of the study because it measures, with statistical significance, the

probability that a student on academic probation will fail to enroll in the following semester (Population Survey Analysis, n.d.).

Control Variables

To control for factors outside of academic probation, such academic performance in high school, first-generation status, and campus living, among others, I add several independent variables to both the OLS regression and Logistic regression models. As mentioned earlier, I present these variables in three groups: institutional factors, student factors, and socioeconomic factors. These selected variables address the number of circumstances and characteristics that impact the student experience and outcomes. This control measure strengthens the significance of the expected effect of the explanatory variable (academic probation) on the dependent variables (GPA change and student departure). I display the descriptive statistics of each variable in Table 4.

Table 4. Descriptive Statistics

Variable Name	Observations	Mean	Standard Deviation	Min	Max
GPACHange	1053	.005169	.0488029	-.097	.5
DropoutNextSemDummy	1528	.0837696	.2771327	0	1
Institutional Factors					
TermsElapsed	1528	2.554319	1.654802	1	8
Cohort14Dummy	1528	.2938482	.4556724	0	1
Cohort15Dummy	1528	.2774869	.4479054	0	1
Cohort16Dummy	1528	.2670157	.4425455	0	1
CollegeALSDummy	1528	.0948953	.2931662	0	1
CollegeCBADummy	1528	.1014398	.302009	0	1
CollegeECSDummy	1528	.2041885	.4032393	0	1
CollegeEDDummy	1528	.0287958	.167287	0	1
CollegeNSMDummy	1528	.2460733	.4308628	0	1
CollegeSSISDummy	1528	.1073298	.3096335	0	1
CollegeDummyUN	1528	.0981675	.2976385	0	1

FreshmanDummy	1528	.7486911	.4339078	0	1
SophomoreDummy	1528	.2113874	.4084262	0	1
JuniorDummy	1528	.0373037	.1895669	0	1
OffCampusFirstSemDummy	1528	.7244764	.446924	0	1
FroshSeminarDummy	1528	.0824607	.2751554	0	1
FroshSemiEOPDummy	1528	.059555	.236738	0	1
FroshSemiLCOMDummy	1528	.2356021	.4245135	0	1
FroshSeminarGPA19_199Dummy	1528	.0320681	.1762386	0	1
Student Factors					
GPA19_199Dummy	1528	.3062827	.4610995	0	1
AfAmDummy	1528	.0844241	.2781138	0	1
AsianDummy	1528	.223822	.4169406	0	1
ForeignDummy	1528	.0307592	.172721	0	1
HispanicDummy	1528	.4162304	.4930941	0	1
MultiEthnicDummy	1528	.0530105	.2241277	0	1
NatAmDummy	1528	.0013089	.0361669	0	1
PacificIslanderDummy	1528	.0085079	.0918749	0	1
UnknownDummy	1528	.033377	.1796777	0	1
FemaleDummy	1528	.479712	.4997518	0	1
EnlishRemedialDummy	1528	.158377	.3652136	0	1
MathRemedialDummy	1528	.1570681	.3639841	0	1
EngMathRemedialDummy	1528	.2905759	.4541768	0	1
PellEligibleDummy	1528	.6060209	.4887903	0	1
FirstGenDummy	1528	.6485602	.4775763	0	1
FirstGenUnknownDummy	1528	.0235602	.1517241	0	1
HighSchoolGPA	1527	3.097439	.36416	2	4.35
SATMathScore	1390	469.5324	77.44292	220	730
SATVerbalScore	1390	457.3741	73.64967	240	740
PublicSchoolDummy	1421	.9282196	.2582149	0	1
OutOfStateHSDummy	1421	.0091485	.0952427	0	1
OtherCAHSDummy	1421	.0014075	.0375029	0	1
LatinxGPA19_199Dummy	1528	.1223822	.327834	0	1
AfAmGPA19_199Dummy	1528	.0242147	.1537654	0	1
PublicSchoolGPA19_199Dummy	1421	.2779733	.4481579	0	1
Socioeconomic Factors					
EOPDummy	1528	.0667539	.2496771	0	1
PellEligibleDummy	1528	.6060209	.4887903	0	1
FirstGenDummy	1528	.6485602	.4775763	0	1
FirstGenUnknownDummy	1528	.0235602	.1517241	0	1
EOPGPA19_199Dummy	1528	.0209424	.1432384	0	1
PellGPA19_199Dummy	1528	.177356	.3820948	0	1
FirstGenGPA19_199Dummy	1528	.1989529	.3993432	0	1

Interaction Variables

According to the literature reviewed, academic probation has a negative disproportionate impact on students of color, first-generation to college students, and low-income students (Ingham & McShane, 1997). Additionally, the research points to student programs such as EOP and first-year seminars as having a positive impact on student outcomes. To account for this disparity in the data, I add a few interaction variables that represent each of these student subsets.

An interaction variable represents the product of two independent variables in a regression analysis. The interaction between these two variables heightens the effect on the dependent variable in a regression model. For the purpose of this study, I multiply the independent variables of interest (*FroshSeminarDummy*, *HispanicDummy*, *AfAmDummy*, *PublicSchoolDummy*, *EOPDummy*, *PellEligibleDummy*, and *FirstGenDummy*) with academic probation (*GPA19.199Dummy*). The resulting interaction variables (listed in Table 1) are: *FroshSeminarGPA19_199Dummy*, *LatinxGPA19_199Dummy*, *AfAmGPA19_199Dummy*, *PublicSchoolGPA19_199Dummy*, *EOPGPA19_199Dummy*, *PellGPA19_199Dummy*, *FirstGenGPA19_199Dummy*.

Like with a standard independent variable, the interaction variable is only statistically significant if the p-value for both the interaction variable and explanatory variable is ≤ 0.10 . Thus, if the interaction variable is statistically significant and the explanatory variable is not, the interaction variable is excluded from the regression analysis.

Hypothesis

This study includes a significant number of causal variables; I note their expected effect in Table 3. In general, I hypothesize that receiving academic probation has a negative effect for both GPA change in the following semester and academic departure in the following semester. That is to say that, for any given student, landing on academic probation lowers a student's GPA attainment in the following semester and also discourages a student from enrolling in the following semester. This affirms findings out of the University of Georgia (2006) which concluded that students who landed on academic probation had a 20% higher risk of leaving the university before the end of their first year than their non-probation peers. Moreover, the adverse effect of academic probation is widely noted in the literature reviewed, impacting the educational experience of students at many levels, from having a negative psychological effect (Lyubomirsky, Boehm, Kasri, and Zehm, 2011) to reducing completion rates (University of California, 2013). Therefore, my null hypothesis is that academic probation has zero effect on these student outcomes. The alternate hypothesis is that academic probation has an adverse effect on student GPA and persistence (enrolling in the following semester).

Additionally, as noted in Table 3, I wish to test whether the adverse impact of academic probation is disproportionate for students of color, low-income students, first-generation to college students, among other vulnerable populations. Smedley, Myers, and Harrell (1989) found that minority status stress negatively impacted academic success and psychological adaptation for students of color at predominately white university settings. Moreover, researcher from the University of California, Berkeley (2013) points

to the disproportionate impact of academic probation on low-income, first-generation-to-college, international student, and students identifying as an underrepresented minority. To test for this disparity, I add interaction variables between my explanatory variable *GPA19_199Dummy* (academic probation) and variables that represent the circumstances discussed in the literature (*FroshSeminarDummy*, *HispanicDummy*, *AfAmDummy*, *PublicSchoolDummy*, *EOPDummy*, *PellEligibleDummy*, and *FirstGenDummy*). The following section concludes chapter three.

Conclusion

In this chapter, I discussed the data source, data content, and data modifications. Additionally, I discussed the regression analysis models employed in this study and why these are appropriate given the scope of my analysis and data set. Moreover, I describe the variables used and explain why I organize them in specific groups. I also explain the theoretical framework for each regression model and how the variable groups interact with the dependent variable in each model. Lastly, I presented my hypothesis and general expected effects for the causal variables. In the next chapter, I present and interpret the findings from my regression models.

Chapter 4

FINDINGS

In the previous chapter, I discussed the data used, theoretical framework applied, and explained the specific statistical models employed and why these are appropriate to my particular study. Additionally, I presented the null hypothesis of this study, which states that academic probation has no statistically significant effect on student academic performance and student departure. This chapter describes the findings of my study. To begin, I report the results of my initial regression model, a standard OLS regression; using this model, I test for multicollinearity and heteroscedasticity. I then describe how these results influence subsequent OLS regression models and present the statistically significant findings for each. These models test the effect of academic probation on GPA change (+/-) in the following semester after receiving academic probation. Additionally, I present the results of two logistic regression models that test the influence of academic probation on student departure in the following semester after receiving academic probation. I conclude by providing an analysis of all statistically significant variables.

Standard OLS Regression

I begin this study by testing the assumption that academic probation serves as a wake-up call, intended to improve academic performance in the following semester after receiving academic probation. Therefore, the dependent variable in the regression analysis is *GPACHange* and the explanatory variable is *GPA19_199*, which represents the student being placed on academic probation. I also add several independent variables that control for institutional, student, and socioeconomic factors. I conduct an OLS regression

analysis because the dependent variable (*GPACHange*) is continuous. The results of this initial regression are shown in Table 5.

Table 5. Ordinary Least Squares (OLS) Regression – Standard Model

Variable	Ordinary Least Squares (OLS) Regression – Standard				
	Coefficient	Standard Error	t	P> t	[95% Confidence Intervals]
GPA19_199	-.0022856	.0036405	-0.63	0.530	-.009431 .0048598
TermsElapsed	-.0093206	.0017068	-5.46	0.000	-.0126706 -.0059706
Cohort14Dummy	.0064898	.0064546	1.01	0.315	-.006179 .0191586
Cohort15Dummy	.0010948	.0061379	0.18	0.858	-.0109524 .0131419
Cohort16Dummy	-.0035924	.0061015	-0.59	0.556	-.0155682 .0083833
CollegeALSDummy	-.0111378	.0063077	-1.77	0.078	-.0235183 .0012427
CollegeCBADummy	.0028856	.0059212	0.49	0.626	-.0087363 .0145075
CollegeECSDummy	-.0038429	.0052909	-0.73	0.468	-.0142275 .0065418
CollegeEDDummy	-.0268891	.0114937	-2.34	0.020	-.0494483 .0043298
CollegeNSMDummy	.0010592	.00622574	0.17	0.866	-.0112225 .0133408
CollegeSSISDummy	-.0000881	.0058737	-0.01	0.988	-.0116166 .0114405
CollegeUNDummy	-.004339	.006461	-0.67	0.502	-.0170202 .0083423
FreshmanDummy	-.0103841	.0355033	-0.29	0.770	-.0800682 .0593
SophomoreDummy	.0006334	.0349039	0.02	0.968	-.0678742 .0691411
JuniorDummy	.0108158	.0360014	0.30	0.764	-.0598458 .0814774
OffCampusFirstSemDummy	.0060667	.0037525	1.62	0.106	-.0012985 .0134319
FroshSeminarDummy	.0026762	.0061419	0.44	0.663	-.0093788 .0147311
FroshSemiEOPDummy	.016589	.0134648	1.23	0.218	-.0098389 .043017
FroshSemiLCOMDummy	-.0026093	.0039991	-0.65	0.514	-.0104586 .0052399
AfAmDummy	.0095394	.0071778	1.33	0.184	-.0045488 .0236276
AsianDummy	.0041561	.0056807	0.73	0.465	-.0069936 .0153058
ForeignDummy	-.0151453	.0110567	-1.37	0.171	-.0368469 .0065563
HispanicDummy	.0054528	.0050536	1.08	0.281	-.0044662 .0153719
MultiEthnicDummy	.0051897	.0080862	0.64	0.521	-.0106815 .021061
NatAmDummy	-.0262559	.0344999	-0.76	0.447	-.0939706 .0414588
PacificIslanderDummy	-.0230145	.0154007	-1.49	0.135	-.0532422 .0072132
UnknownDummy	-.0026862	.0105276	-0.26	0.799	-.0233493 .0179769
FemaleDummy	-.0051746	.0038546	-1.34	0.180	-.0127401 .002391
EnglishRemedialDummy	.0023523	.0057608	0.41	0.683	-.0089547 .0136592
MathRemedialDummy	.0134175	.0058007	2.31	0.021	.0020323 .0248028
EngMathRemedialDummy	.0148488	.0057439	2.59	0.010	.0035749 .0261226

HighSchoolGPA	.006261	.0047139	1.33	0.184	-.0029911	.0155131
SATMathScore	-.0000101	.0000334	-0.30	0.763	-.0000756	.0000555
SATVerbalScore	-4.91e-06	.000035	-0.14	0.888	-.0000736	.0000637
PublicSchoolDummy	-.0004262	.0068735	-0.06	0.951	-.0139171	.0130647
OutOfStateHSDummy	-.0223418	.0197369	-1.13	0.258	-.0610803	.0163968
OtherCAHSDummy	-.013033	.0505537	-0.26	0.797	-.1122573	.0861913
EOPDummy	-.0190184	.0131236	-1.45	0.148	-.0447768	.00674
PellEligibleDummy	-.0031618	.0037929	-0.83	0.405	-.0106042	.0042826
FirstGenDummy	-.000039	.0038959	-0.01	0.992	-.0076857	.0076077
FirstGenUnknownDummy	.0059066	.0117584	0.50	0.616	-.0171723	.0289854
_cons	.0151257	.0457419	0.33	0.741	-.0746542	.1049056

As shown in Table 5, this preliminary regression does not find statistical significance between academic probation and GPA change (+/-) in the following semester after receiving academic probation. The regression generates a p-value of 0.530 for the dependent variable *GPA19_199*, meaning the outcomes of the regression are not in the 90% (p-value <.10) confidence range and therefore not statistically significant. I then proceed to test for multicollinearity and heteroscedasticity. I describe why I do this and the process used in the following section.

Multicollinearity and Heteroscedasticity

Multicollinearity

Multicollinearity refers to correlation between independent variables in a regression model. If multicollinearity between variables is high enough, it disrupts the accuracy of results and ability to interpret the findings by biasing a regression coefficient's standard error and hence t-statistic upward. To test for multicollinearity in the regression, I apply a Variance Inflation Factors (VIF) test using the *estat vif* command in STATA. The output of this test is listed in Table 6. A VIF score above 5 indicates the

presence of multicollinearity, while a score above 10 represents a high level of correlation between independent variables (multicollinearity). The only independent variables in the regression that exhibit multicollinearity are *FreshmanDummy*, *SophomoreDummy*, and *JuniorDummy*. These variables indicate the student's college level for each data point. These variables likely suffer from multicollinearity because they essentially measure the same value as the variable *TermsElapsed*, which is the length of time a student has been at the college. I exclude these variables (*FreshmanDummy*, *SophomoreDummy*, and *JuniorDummy*) from future regression because of multicollinearity and because the variable *TermsElapsed* also measures the time a student has been at the institution.

Table 6. Variance Inflation Factors (VIF)

Variable	VIF	1/VIF
FreshmanDummy	129.52	0.007721
SophomoreDummy	112.09	0.008921
JuniorDummy	25.14	0.039773
TermsElapsed	2.99	0.334712
EOPDummyYES	2.72	0.367955
EngMathRemedialDummy	2.69	0.371167
FroshSemiEOPDummy	2.67	0.373974
CohortDummy14	2.65	0.377909
SATMathScore	2.50	0.399837
HispanicDummy	2.50	0.400344
SATVerbalScore	2.44	0.409675
CohortDummy15	2.39	0.419063
CohortDummy16	2.19	0.455975
AsianDummy	2.10	0.477010
CollegeDummyECS	1.80	0.554619
EnglishRemedialDummy	1.65	0.604564
MathRemedialDummy	1.64	0.608045
AfAmDummy	1.52	0.657010

FemaleDummy	1.41	0.708611
ForeignDummy	1.37	0.729096
FirstGenDummy	1.37	0.729372
CollegeDummyNSM	1.36	0.736372
PellEligibilityDummy	1.36	0.736730
CollegeDummySSIS	1.35	0.740633
MultiEthnicDummy	1.34	0.794037
CollegeDummyUN	1.33	0.753865
CollegeDummyCBA	1.32	0.754790
CollegeDummyALS	1.32	0.758529
PublicSchoolDummy	1.25	0.800879
UnknownDummy	1.20	0.834984
CollegeDummyED	1.18	0.846864
OutOfStateDummy	1.16	0.860430
FroshSemiLCOMDummy	1.13	0.881152
OffCampusFirstSemDummy	1.13	0.881254
HighSchoolGPA	1.12	0.892276
PacificIslanderDummy	1.11	0.903668
FroshSeminarDummy	1.10	0.910313
FirstGenUnknownDummy	1.10	0.913188
OtherCAHSDummy	1.07	0.931891
GPA19_199	1.05	0.952527
NatAmDummy	1.03	0.975500
Mean VIF	4.07	

Heteroscedasticity

Heteroscedasticity occurs when the regression produces an unequal spread (variance) of the residuals across the range of observations. This creates a systematic change in how the regression line fits along the dependent and explanatory variables. In essence, a regression model that suffers from heteroscedasticity is less precise and more likely to produce inadequate measures. To test for heteroscedasticity, I apply a Breusch-Pagan specification test by using the *estat hettest* command in STATA after running a

new regression that excludes the omitted variables (*FreshmanDummy*, *SophomoreDummy*, and *JuniorDummy*). The test generates a chi-squared value of 20.27 and a P value of 0.0000; the high chi-squared suggests there is in fact a problem of heteroscedasticity in my regression.

To correct for heteroscedasticity, I run a robust OLS regression model, using the robust standard error instead of the standard error. A robust regression minimizes the effect of outlier observations and strengthens the fit of the linear regression; which in effect, counters the pull of heteroscedasticity. I use the robust process for all future regression models. I describe the results of the robust OLS regression in the following section.

Robust OLS Regressions

After testing for multicollinearity and heteroscedasticity, I alter the data and regression model appropriately. I then run a robust OLS regression, using only the initial independent variables, and not the interaction variables I created. The results of this regression are shown in Table 7.

Table 7. Robust Ordinary Least Squares (OLS) Regression

Variable	Ordinary Least Squares (OLS) Regression – Standard				
	Coefficient	Standard Error	t	P> t	[95% Confidence Intervals]
GPA19_199	-0.0021267	0.0032460	-0.66	0.513	-0.0084978 0.0042444
TermsElapsed	-0.0068254	0.0012236	-5.58	0.000	-0.009227 -0.0044239
Cohort14Dummy	0.0064619	0.0072282	0.89	0.372	-0.0077251 0.0206489
Cohort15Dummy	0.0009666	0.0061628	0.16	0.875	-0.0111294 0.0130626
Cohort16Dummy	-0.0040292	0.0061147	-0.66	0.510	-0.0160307 0.0079724
CollegeALSDummy	-0.0107038	0.0060868	-1.76	0.079	-0.0226506 0.001243

CollegeCBADummy	0.0030209	0.0057944	0.52	0.602	-0.008352	0.0143938
CollegeECSDummy	-0.0036768	0.0053598	-0.69	0.493	-0.0141967	0.0068432
CollegeEDDummy	-0.027261	0.0109552	-2.49	0.013	-0.0487631	-0.0057589
CollegeNSMDummy	0.0007316	0.0057841	0.13	0.899	-0.010621	0.0120842
CollegeSSISDummy	0.0001329	0.0059181	0.02	0.982	-0.0114827	0.0117485
CollegeUNDummy	-0.0038442	0.0060873	-0.63	0.528	-0.015792	0.0081036
OffCampusFirstSemDummy	0.0059825	0.0035907	1.67	0.096	-0.0010651	0.0130301
FroshSeminarDummy	0.0020321	0.0053351	0.38	0.703	-0.0084393	0.0125035
FroshSemiEOPDummy	0.0186353	0.0125007	1.49	0.136	-0.0059003	0.0431709
FroshSemiLCOMDummy	-0.0025716	0.0037669	-0.68	0.495	-0.0099649	0.0048218
AfAmDummy	0.010267	0.0068479	1.50	0.134	-0.0031737	0.0237077
AsianDummy	0.0051733	0.0056676	0.91	0.362	-0.0059508	0.0162973
ForeignDummy	-0.0141642	0.0102538	-1.38	0.168	-0.0342898	0.0059614
HispanicDummy	0.0062049	0.0050270	1.23	0.217	-0.0036618	0.0160717
MultiEthnicDummy	0.00639	0.0079984	0.80	0.425	-0.0093089	0.0220888
NatAmDummy	-0.0228716	0.0073944	-3.09	0.002	-0.0373849	-0.0083583
PacificIslanderDummy	-0.0201733	0.0174957	-1.15	0.249	-0.0545129	0.0141663
UnknownDummy	-0.0023045	0.0115058	-0.20	0.841	-0.0248874	0.0202783
FemaleDummy	-0.0047761	0.0037077	-1.29	0.198	-0.0120534	0.0025012
EnglishRemedialDummy	0.0022988	0.0059463	0.39	0.699	-0.0093721	0.0139698
MathRemedialDummy	0.0126952	0.0063109	2.01	0.045	0.0003086	0.0250818
EngMathRemedialDummy	0.0141006	0.0055284	2.55	0.011	0.0032497	0.0249514
HighSchoolGPA	0.006903	0.0047882	1.44	0.150	-0.0024949	0.0163009
SATMathScore	-5.81E-06	0.0000316	-0.18	0.854	-0.0000679	0.0000562
SATVerbalScore	4.76E-06	0.0000345	0.14	0.890	-0.000063	0.0000725
PublicSchoolDummy	-0.0004058	0.0063254	-0.06	0.949	-0.012821	0.0120094
OutOfStateHSDummy	-0.0194452	0.0184486	-1.05	0.292	-0.0556551	0.0167646
OtherCAHSDummy	-0.0142377	0.0153680	-0.93	0.354	-0.044401	0.0159257
EOPDummy	-0.0195533	0.0124259	-1.57	0.116	-0.0439421	0.0048356
PellEligibleDummy	-0.0031943	0.0035899	-0.89	0.374	-0.0102403	0.0038517
FirstGenDummy	0.0001613	0.0037071	0.04	0.965	-0.0071147	0.0074374
FirstGenUnknownDummy	0.0042387	0.0096850	0.44	0.662	-0.0147705	0.023248
_cons	-0.0074645	0.0250205	-0.30	0.766	-0.0565733	0.0416443

This test also does not find a statistically significant effect of the explanatory variable *GPA19_199* (academic probation) on the dependent variable *GPACHange* (GPA change (+/-) in the following semester after receiving academic probation). The p-value

for *GPA19_199* is 0.513; a statistically significant p-value is set at $p < .10$. Therefore, I do not reject the null hypothesis that academic probation has no effect on student academic performance in the following semester after receiving academic probation. In other words, my analysis indicates that academic probation does not improve or hinder academic performance in the following semester after receiving academic probation. This is important because the traditional way of thinking about putting a student on probation is that it motivates them to raise their GPA the following semester. Here, for students who's GPA fell between 1.9 and 2.1, for those that fell below 2.0 and placed on probation, their GPA change in the following semester was no higher or lower.

To further validate the findings of the regression, I run the regression again with the interaction variables described in chapter 3. I first run separate regressions with each added individual interaction variable. I then add all interaction variables to one regression model. None of these regression models returns a statistically significant effect for my dependent variable. I depict in Table 8 the robust OLS regression with all interaction variables. This further strengthens the inability to reject the null hypothesis. Again, academic probation does have a statistically significant effect on GPA change (+/-) in the following semester after receiving academic probation.

Table 8. Robust OLS Regression with Interaction Variables

Variable	OLS Regression with Interaction Variables				
	Coefficient	Robust Standard Error	t	P> t	[95% Confidence Intervals]
GPA19_199	-0.0033034	0.0122571	-0.27	0.788	-0.0273612 0.0207545
TermsElapsed	-0.0069395	0.0012249	-5.67	0	-0.0093437 -0.0045354
Cohort14Dummy	0.0068058	0.0072567	0.94	0.349	-0.0074374 0.021049

Cohort15Dummy	0.001184	0.0061779	0.19	0.848	-0.0109417	0.0133097
Cohort16Dummy	-0.0041138	0.0061391	-0.67	0.503	-0.0161633	0.0079357
CollegeALSDummy	-0.0106972	0.0061711	-1.73	0.083	-0.0228095	0.0014152
CollegeCBADummy	0.0034471	0.0057912	0.6	0.552	-0.0079197	0.014814
CollegeECSDummy	-0.0036305	0.005404	-0.67	0.502	-0.0142373	0.0069763
CollegeEDDummy	-0.0277388	0.010912	-2.54	0.011	-0.0491564	-0.0063212
CollegeNSMDummy	0.0006862	0.0058544	0.12	0.907	-0.0108046	0.0121769
CollegeSSISDummy	0.0002441	0.0059735	0.04	0.967	-0.0114805	0.0119686
CollegeUNDummy	-0.0038482	0.0061422	-0.63	0.531	-0.0159038	0.0082075
OffCampusFirstSemDummy	0.0059094	0.0035854	1.65	0.1	-0.001128	0.0129468
FroshSeminarDummy	0.0070293	0.007556	0.93	0.352	-0.0078014	0.02186
FroshSemiEOPDummy	0.0181203	0.0125963	1.44	0.151	-0.0066031	0.0428438
FroshSemiLCOMDummy	-0.0026711	0.0037758	-0.71	0.479	-0.010082	0.0047398
AfAmDummy	0.0094633	0.0079595	1.19	0.235	-0.0061593	0.025086
AsianDummy	0.0048666	0.0057066	0.85	0.394	-0.0063342	0.0160673
ForeignDummy	-0.0139827	0.0103794	-1.35	0.178	-0.0343551	0.0063897
HispanicDummy	0.0067516	0.0056486	1.2	0.232	-0.0043353	0.0178385
MultiEthnicDummy	0.006948	0.0080619	0.86	0.389	-0.0088755	0.0227716
NatAmDummy	-0.0242649	0.0084161	-2.88	0.004	-0.0407836	-0.0077462
PacificIslanderDummy	-0.0208366	0.0176623	-1.18	0.238	-0.0555035	0.0138303
UnknownDummy	-0.0025559	0.0115674	-0.22	0.825	-0.02526	0.0201482
FemaleDummy	-0.0047061	0.003742	-1.26	0.209	-0.0120506	0.0026385
EnglishRemedialDummy	0.0019643	0.0059977	0.33	0.743	-0.0098078	0.0137365
MathRemedialDummy	0.0126691	0.0063709	1.99	0.047	0.0001645	0.0251737
EngMathRemedialDummy	0.0139767	0.0055735	2.51	0.012	0.0030372	0.0249162
HighSchoolGPA	0.0064836	0.004848	1.34	0.181	-0.0030319	0.0159992
SATMathScore	-4.41E-06	0.0000319	-0.14	0.89	-0.000067	0.0000582
SATVerbalScore	3.16E-06	0.0000347	0.09	0.928	-0.0000649	0.0000712
PublicSchoolDummy	-0.0000787	0.0077215	-0.01	0.992	-0.0152341	0.0150767
OutOfStateHSDummy	-0.0194568	0.0189114	-1.03	0.304	-0.0565753	0.0176617
OtherCAHSDummy	-0.0131755	0.0158918	-0.83	0.407	-0.0443672	0.0180163
EOPDummy	-0.0141408	0.0129857	-1.09	0.276	-0.0396286	0.011347
PellEligibleDummy	-0.0045297	0.0044985	-1.01	0.314	-0.0133591	0.0042997
FirstGenDummy	-0.0004907	0.0045715	-0.11	0.915	-0.0094634	0.0084821
FirstGenUnknownDummy	0.0064042	0.0098538	0.65	0.516	-0.0129365	0.025745
FroshSeminarGPA19_199	-0.0125958	0.0104241	-1.21	0.227	-0.0330558	0.0078642
AfAmGPA19_199	0.0012856	0.0123281	0.1	0.917	-0.0229115	0.0254826
HispanicGPA19_199	-0.0034177	0.0072685	-0.47	0.638	-0.0176841	0.0108486
PublicSchoolGPA19_199	-0.0005052	0.0121283	-0.04	0.967	-0.0243101	0.0232997
EOPGPA19_199	-0.0170005	0.0145039	-1.17	0.241	-0.0454682	0.0114673
PellGPA19_199	0.0056062	0.0070205	0.8	0.425	-0.0081733	0.0193857
FirstGenGPA19_199	0.003318	0.0074018	0.45	0.654	-0.01121	0.0178461
_cons	-0.0056958	0.025961	-0.22	0.826	-0.056651	0.0452594

Robust Logistic Regressions

I conduct a robust logistic regression to test the null hypothesis that academic probation does not have a statistically significant effect on student departure in the following semester after receiving academic probation. The logistic regression model is appropriate because my dependent variable is dichotomous, with only two outcomes; the student either enrolled in the following semester (coded as 0) or did not enroll in the following semester (coded as 1). I use the dependent dummy variable *DropoutNextSemDummy* to represent the observations where a student did not enroll in the following semester after receiving academic probation (coded as 1).

I list the results of this regression in Table 9. The p-value of 0.003 of the explanatory variable *GPA19_199* (academic probation) indicates with 99.7% confidence in two-tailed test of statistical significance, that being placed on academic probation produces an effect that is different than zero. Therefore, I can reject the null hypothesis and affirm that academic probation has a positive influence on student departure in the semester following academic probation. The odds ratio, which tells the magnitude of this effect, is particularly high at 1.90 and indicates that students in the 1.9 to 2.1 GPA, who land on academic probation by falling below a cumulative 2.0 GPA, are almost twice as likely to drop out in the following semester after receiving academic probation, as compared to those who do not. This affirms the hypothesis that academic probation is detrimental to student retention.

Table 9. Logistic Regression

Variable	Logistic Regression				
	Odds Ratio	Robust Standard Error	z	P> z	[95% Confidence Intervals]
GPA19_199	1.901202	0.4127805	2.96	0.003	1.242279 2.909627
TermsElapsed	1.321351	0.0951466	3.87	0.000	1.147428 1.521636
Cohort14Dummy	0.9409039	0.3922885	-0.15	0.884	0.4155814 2.130269
Cohort15Dummy	1.013669	0.3715666	0.04	0.97	0.4941771 2.079262
Cohort16Dummy	0.9400147	0.3519709	-0.17	0.869	0.4512511 1.958173
CollegeALSDummy	1.973769	0.7801379	1.72	0.085	0.9096123 4.282883
CollegeCBADummy	1.322202	0.5582207	0.66	0.508	0.5780014 3.024592
CollegeECSDummy	0.9276744	0.3631455	-0.19	0.848	0.430711 1.998045
CollegeEDDummy	3.058491	1.662708	2.06	0.04	1.053811 8.8767
CollegeNSMDummy	2.325727	0.845917	2.32	0.02	1.140141 4.744157
CollegeSSISDummy	0.7774091	0.3458261	-0.57	0.571	0.3250853 1.859096
CollegeUNDummy	1.318868	0.5735807	0.64	0.525	0.5623551 3.093087
OffCampusFirstSemDummy	1.230325	0.3168106	0.8	0.421	0.742735 2.038006
FroshSeminarDummy	0.7733836	0.2997669	-0.66	0.507	0.3617974 1.653196
FroshSemiEOPDummy	0.3113195	0.2116889	-1.72	0.086	0.0821131 1.180322
FroshSemiLCOMDummy	0.5908074	0.1640014	-1.9	0.058	0.3428957 1.017958
AfAmDummy	0.5721548	0.2795701	-1.14	0.253	0.2195805 1.490848
AsianDummy	0.543904	0.1798956	-1.84	0.066	0.2844385 1.040055
ForeignDummy	0.8175827	0.5230788	-0.31	0.753	0.2333157 2.864965
HispanicDummy	0.4956306	0.1531324	-2.27	0.023	0.2704998 0.908132
MultiEthnicDummy	0.5505139	0.3068452	-1.07	0.284	0.1846401 1.641386
NatAmDummy	1	(omitted)*			
PacificIslanderDummy	1	(omitted)*			
UnknownDummy	0.9948431	0.5844894	-0.01	0.993	0.3145266 3.146674
FemaleDummy	0.9820173	0.2487479	-0.07	0.943	0.597733 1.613359
EnglishRemedialDummy	0.8087059	0.301503	-0.57	0.569	0.3894434 1.679333
MathRemedialDummy	0.7880191	0.2841198	-0.66	0.509	0.3887197 1.597486
EngMathRemedialDummy	0.5952452	0.2171462	-1.42	0.155	0.29119 1.216789
HighSchoolGPA	1.504363	0.4546573	1.35	0.177	0.8319504 2.720243
SATMathScore	0.9978505	0.0022408	-0.96	0.338	0.9934683 1.002252
SATVerbalScore	1.002609	0.002311	1.13	0.258	0.9980898 1.007149
PublicSchoolDummy	1.3344	0.6115853	0.63	0.529	0.543452 3.276504
OutOfStateHSDummy	2.518944	2.929821	0.79	0.427	0.257735 24.61862
OtherCAHSDummy	1	(omitted)*			
EOPDummy	5.404366	3.084406	2.96	0.003	1.765806 16.54042
PellEligibleDummy	1.239051	0.3089235	0.86	0.39	0.7600903 2.019822
FirstGenDummy	0.9692269	0.248741	-0.12	0.903	0.5861035 1.60279
FirstGenUnknownDummy	0.2636118	0.2765238	-1.27	0.204	0.0337342 2.059961
_cons	0.0076714	0.0127764	-2.92	0.003	0.0002932 0.200687

*No students in the logistic regression data set exhibited this characteristic.

A number of independent variables also show statistical significance in this regression. The likelihood that a student departs in the following semester, irrespective of receiving academic probation, increases with each term elapsed (*TermsElapsed*). Additionally, students enrolled in the College of Arts and Letters, College of Education, and College of Natural Science and Mathematics, are statistically more likely to drop out in the following semester, when compared with their baseline. Moreover, the regression shows that students who participate in the EOP Freshman Seminar and Learning Community Freshman Seminar are also more likely to not enroll in the following semester after receiving academic probation. Likewise, students that participate in EOP are less likely to enroll in the following semester after receiving academic probation. Finally, academic probation has a statistically significant impact on Asian and Hispanic students. For these students, there is a higher likelihood that they will continue their education in the following semester after receiving academic probation.

To further test the strength of the relationship between the explanatory variable and dependent variable, I run the logistic regression model with interaction variables included. Like in the OLS regression, I do this by first running separate regression with each individual interaction variable. I then run the regression with all interaction variables included. These regressions do not find a statistically significant relationship. The output of the logistic regression with all interaction variables is depicted in Table 10.

Table 10. Logistic Regression with Interaction Variables

Variable	Logistic Regression with Interaction Variables				
	Odds Ratio	Robust Standard Error	z	P> z	[95% Confidence Intervals]
DropoutNextSemDummy					
GPA19_199	0.5614879	0.5244413	-0.62	0.537	0.090012 3.502517
TermsElapsed	1.320881	0.0963622	3.81	0	1.144896 1.523917
Cohort14Dummy	0.9916563	0.408621	-0.02	0.984	0.442197 2.223855
Cohort15Dummy	1.067416	0.3918837	0.18	0.859	0.519792 2.191987
Cohort16Dummy	0.9613816	0.3598311	-0.11	0.916	0.46164 2.002111
CollegeALSDummy	1.952528	0.7798216	1.68	0.094	0.8925559 4.271292
CollegeCBADummy	1.40757	0.5903988	0.82	0.415	0.6186388 3.202599
CollegeECSDummy	0.9553985	0.3742698	-0.12	0.907	0.4433361 2.058904
CollegeEDDummy	2.632689	1.482281	1.72	0.086	0.8732691 7.936901
CollegeNSMDummy	2.50297	0.9067828	2.53	0.011	1.230495 5.09133
CollegeSSISDummy	0.756665	0.3358829	-0.63	0.53	0.3169977 1.806139
CollegeUNDummy	1.376421	0.5948204	0.74	0.46	0.5900711 3.210687
OffCampusFirstSemDummy	1.212491	0.3199824	0.73	0.465	0.7228402 2.033831
FroshSeminarDummy	0.8683892	0.523578	-0.23	0.815	0.2663786 2.830932
FroshSemiEOPDummy	0.2794289	0.1850632	-1.93	0.054	0.0763006 1.023327
FroshSemiLCOMDummy	0.5610107	0.1544351	-2.1	0.036	0.3270788 .9622546
AfAmDummy	0.3035545	0.2230683	-1.62	0.105	0.0718998 1.28158
AsianDummy	0.5003457	0.1685279	-2.06	0.04	0.2585628 .9682206
ForeignDummy	0.8485997	0.5456305	-0.26	0.798	0.2406575 2.992308
HispanicDummy	0.4733764	0.1727586	-2.05	0.04	0.2315052 .9679488
MultiEthnicDummy	0.5420152	0.2942787	-1.13	0.259	0.1870101 1.570934
NatAmDummy	1	(omitted)*			
PacificIslanderDummy	1	(omitted)*			
UnknownDummy	0.8861544	0.4938542	-0.22	0.828	0.2972586 2.641705
FemaleDummy	0.9658068	0.2495601	-0.13	0.893	0.5820277 1.602643
EnglishRemedialDummy	0.8001014	0.3068652	-0.58	0.561	0.3772952 1.696715
MathRemedialDummy	0.8194182	0.3040814	-0.54	0.591	0.3959402 1.695827
EngMathRemedialDummy	0.5902571	0.2217117	-1.4	0.16	0.2826922 1.232448
HighSchoolGPA	1.4289	0.4439758	1.15	0.251	0.7771836 2.627121
SATMathScore	0.9976046	0.0022314	-1.07	0.284	0.9932407 1.001988
SATVerbalScore	1.002601	0.0023747	1.1	0.273	0.9979578 1.007267
PublicSchoolDummy	1.140702	0.6098429	0.25	0.805	0.4000387 3.252686
OutOfStateHSDummy	2.38308	2.63625	0.78	0.432	0.2725889 20.83382
OtherCAHSDummy	1	(omitted)*			

EOPDummy	9.474837	5.960944	3.57	0	2.760907	32.5156
PellEligibleDummy	0.8177065	0.2674328	-0.62	0.538	0.4307349	1.552333
FirstGenDummy	0.7624092	0.2478209	-0.83	0.404	0.4031858	1.441687
FirstGenUnknownDummy	0.2590525	0.2407261	-1.45	0.146	0.0419183	1.600928
FroshSeminarGPA19_199	0.7005009	0.5363043	-0.46	0.642	0.1562168	3.141157
AfAmGPA19_199	2.979277	2.868971	1.13	0.257	0.4512575	19.66967
HispanicGPA19_199	0.8624514	0.4268463	-0.3	0.765	0.326931	2.275166
PublicSchoolGPA19_199	1.34683	1.20008	0.33	0.738	0.2348861	7.722681
EOPGPA19_199	0.3181635	0.2468553	-1.48	0.14	0.0695383	1.455716
PellGPA19_199	2.850625	1.372677	2.18	0.03	1.109318	7.325274
FirstGenGPA19_199	1.798225	0.9263764	1.14	0.255	0.6551452	4.935718
_cons	0.0175407	0.0305035	-2.33	0.02	0.0005805	.5300272
*No students in the logistic regression data set exhibited this characteristic.						

Count R-squared

After finding statistical significance in the logistic regression model (without interaction variables), I generate a Count R-squared table using the regression output. A Count R-squared transforms the odds ratios into a binary variable on the same scale as the outcome variable (0-1) and then assesses the predictions as correct or incorrect (UCLA- Institute for Digital Research & Education). In other words, the Count R-squared measures the power of predictability for a given model. In this case, I am assessing to what extent (percentage wise) the logistic regression model will predict if any given student within the GPA range between 1.9 and 2.1, for those below 2.0, will drop out in the following semester. The Count R-squared generates 90.92% correctly classified, meaning that the logistic regression model is correctly predicting the 90.92% of students who drop out after receiving academic probation. The output also shows that for students who drop out, the model does not predict why they drop out. I interpret this by examining the 0.00% sensitivity value. The model does however predict with 99.49%

(specificity) whether a given student within a GPA range between 1.9 and 2.1, for those below 2.0, will enroll in the following semester. I list these values in Table 11.

Table 11. Count R-squared

Classified	True		Total
	D	~D	
+	1	3	4
-	110	1161	1271
Total	110	1167	1277
Classified + if predicted $\Pr(D) \geq .5$			
True D defined as DropoutNextSem = 0			
Sensitivity	$\Pr(+ D)$		0.00%
Specificity	$\Pr(- \sim D)$		99.49%
Positive Predictive Value	$\Pr(\sim D +)$		0.00%
Negative Predictive Value	$\Pr(\sim D -)$		91.35%
False + rate for true ~D	$\Pr(+ \sim D)$		0.51%
False - rate for true D	$\Pr(- D)$		100.00%
False + rate for classified +	$\Pr(\sim D +)$		100.00%
False - rate for classified -	$\Pr(D -)$		8.65%
Correctly Classified			90.92%

Conclusion

In this chapter, I presented the results of multiple regression models, including standard OLS, robust OLS, and logistic models. I was unable to reject the null hypothesis that academic probation has a statistically significant influence on GPA change (+/-) in the following semester after receiving academic probation. That is, academic probation does not have a positive or negative impact on student GPA in the following semester after receiving academic probation. This counters the narrative that academic probation

serves as a “wake-up” call and therefore improves GPA in the following semester after receiving academic probation. I used a robust OLS regression model to test this hypothesis.

Additionally, I found statistical significance in the relationship between academic probation (explanatory variable) and student departure (dependent variable). Using a robust logistic regression model, I was able to reject the null hypothesis that academic probation has no statistically significant influence on student departure. That is, academic probation does increase the likelihood that a student will not return in the following semester after receiving academic probation. To be more precise, the logistic model shows that students who are put on academic probation are almost twice as likely to drop out in the following semester after receiving academic probation. Lastly, after finding statistical significance in the logistic model, I generate a Count R-squared table to assess the predictability of the model. I find that the regression model holds a 90.92% correctly classified value and can predict with 99.49% certainty whether a given student within a GPA range between 1.9 and 2.1, for those below 2.0, will enroll in the following semester. I also find that the model has no predictability as to why students drop out after receiving academic probation. The final chapter of this study, I discuss possible explanations for my findings and analyze the policy implications of academic probation at Sacramento State.

Chapter 5

CONCLUSION

This study began with a general concern for the rising trend in student departure from institutions of higher education. Student departure not only impacts the individual student, but also carries socioeconomic consequences, such as having a less-educated workforce, revenue loss to the institution, and a cost to the tax-payer of not seeing their investment in a potential college graduate payoff. Though the issue of student departure is covered well in higher education research, the field has widely ignored the connection between academic probation and student departure. Academic probation is an academic policy used by most colleges and universities by which a student receives academic probation status after receiving a cumulative GPA below a college-set standard (typically 2.0) during any given semester. The common perception is that academic probation serves as a tool to “wake-up” students and encourage them to perform better academically. Therefore, the purpose of this study was to use multiple regression analysis to look for a statistically significant effect of academic probation on student outcomes, and more specifically on a student’s GPA and persistence (departure) in the following semester after receiving academic probation. Using longitudinal student data sourced from Sacramento State University for the years 2014-2018, I ran multiple OLS and Logistic regression models to isolate the effect of academic probation.

In this last chapter, I discuss the two key findings of my study: first, this study does not find statistical significance between academic probation and academic performance (GPA change (+/-)) in the following semester after receiving academic

probation; and second, this study finds that academic probation has a statistically significant effect on student departure, that is, academic probation increases the likelihood that a student will not return in the following semester after receiving academic probation.

I review my findings and discuss the policy implications for Sacramento State and for institutions of higher learning in general. Moreover, I provide policy recommendations based on the findings of my study and literature reviewed. I conclude by addressing the limitations of my analysis, providing recommendations for future research, and sharing my concluding thoughts.

Discussion

This study analyzed four consecutive years (2014-2018) of student longitudinal data sourced from the Department of Student Success Initiatives, a division of the Office of Academic Affairs at Sacramento State University. To isolate the effect of academic probation, I restricted data observations to students with a GPA between 1.90 and 2.09, in a given semester. This allowed for two comparison groups, those who earn a GPA that is slightly above the academic probation threshold (2.0) and slightly below.

I followed a similar logic model presented by Lindo, Sanders, & Oreopolous (2008), which explains that an appropriate counterfactual for a student on academic probation who earns a 1.9 GPA is a student not on academic probation who earns a 2.1 GPA. I then used two separate regression models (OLS and Logistic) to answer two distinct questions. First, I used OLS regression analysis to determine if academic probation has an influence on academic performance, i.e. GPA. This question ties directly

to the assumption that academic probation serves as a “wake-up”, intended to encourage students to perform better academically in the following semester. Second, I used Logistic regression analysis to determine if academic probation has a statistically significant effect on student departure. I found compelling evidence for both questions.

OLS Regression: No Statistical Relation between Academic Probation and GPA

To begin, after running several OLS regression models, including standard, robust, and with interaction variables, all while controlling for several independent factors, I find that academic probation does not have a statistically significant effect on student academic performance (GPA). That is, academic probation does not have a positive or negative impact on students’ GPA in the following semester after receiving academic probation. This finding is central to my study because it refutes the notion that academic probation serves as a “wake-up” call, intended to motivate student performance. What I find in my study is that the wake-up call is not working.

Logistic Regression: Academic Probation Increases Likelihood of Student Departure

According to my analysis, academic probation increases the likelihood of student departure. Using logistic regression models, I found statistical significance between academic probation and student departure for students between the 1.9 to 2.1 GPA cutoffs, who land on academic probation by falling below a cumulative 2.0 GPA. These students are almost twice as likely to drop out in the following semester after receiving academic probation, as compared to those who maintain a cumulative GPA between 2.0 and 2.1. This affirms my hypothesis that academic probation is a driving force for student

departure at Sacramento State. Below, I also discuss the other explanatory variable found to exert an influence on whether 1.9 to 2.1 GPAs return the next semester.

Significant Explanatory Factors

In addition to finding statistical significance between academic probation and student departure, the logistic regression also finds statistical significance for a few explanatory variables. I list these in Table 12. The variables are listed in descending order of changing the likelihood of dropout when their value rises by one unit, or switches from zero to one in the case of a dummy dependent variable. Variables having the strongest positive effect (highest ratio percent) are at the top and variables having the strongest negative effect (highest negative ratio percent) are at the bottom. I highlight the academic probation variable (*GPA19_199*) for reference. An odds ratio percent interprets, in percentage, the effect that an explanatory variable has on the dependent variable. In this case, the odds ratio percent is a percent measure of the probability a student in the variable category will depart the university in the following semester. I also list the p-value for each variable; the $((1 - p\text{-value}) \times 100)$ measures the statistical significance of the variable. Meaning, a p-value of $p < 0.10$ is statistically significant at 90% confidence in a two-tailed test.

Table 12. Logistic Regression Statistically Significant Explanatory Variables

Logistic Regression – Statistically Significant Variables		
Variable	Odds Ratio Percent (Odds Ratio – 1 x 100)	P-value
Participation in EOP	440 %	0.004

Enrolled in College of Education	206 %	0.040
Enrolled in College Natural Sciences & Mathematics	133 %	0.020
Enrolled in College of Arts & Letters	97 %	0.085
GPA19_199 (Academic Probation)	90 %	0.003
Term Elapsed	32 %	0.000
Participation in Learning Community Freshman Seminar	- 41 %	0.058
Asian Student	-46 %	0.066
Hispanic Student	- 50 %	0.023

It is important to keep in mind that for all dichotomous variables mentioned above (listed in Table 10.) the odds ratio percent is in comparison to the baseline variable for each respective variable. The baseline for participation in EOP is no participation in EOP; the baseline variable for enrollment in the College of Education, enrollment in the College of Natural Sciences & Mathematics, and enrollment in the College of Arts and Letters, is enrollment in the College of Health & Human Services; the baseline for academic probation is not in academic probation; the baseline for Asian and Hispanic is white; the baseline for participation in a First-year Seminar Learning Community is not participating in any first-year program; and the variable for terms elapsed does not have a baseline because it is a continuous value.

Among the variables presented in Table 10, the variables with a positive odds ratio percent represent a positive effect on the dependent variable (DropoutNextSemDummy), which translates to a measured probability of departure in

the following semester when that variable changes by one. Listed in order of descending odds ratio percent, these variables include, participation in the Educational Opportunity Program (EOP) (*EOPDummy*), enrollment in the College of Education (*CollegeEDDummy*), enrollment in the College of Natural Sciences & Mathematics (*CollegeNSMDummy*), enrollment in the College of Arts and Letters (*CollegeALSDummy*), academic probation (*GPA19_199*), and the term elapsed (*TermElapsed*). Students who participate in EOP, for example, are 425% more likely to drop out in the following semester than non-EOP students. This does not necessarily mean that participation in EOP causes departure, but rather that there is a significant relationship between the variables. An explanation for this could be that EOP enrolls a high number of students susceptible to departure. Moreover, because admittance to EOP requires that the student participant meet a low-income threshold, the EOP variable could be identifying other factors such as growing up low-income and being first-generation to college. The literature reviewed supports this finding and highlights the particular challenges that low-income and first-generation to college students face in higher education. This finding brings to light a student issue that EOP at Sacramento State can focus on. The following three variables (*CollegeEDDummy*, *CollegeNSMDummy*, and *CollegeALSDummy*) each represent a college at Sacramento State. For a student enrolled in the College of Education, between the GPA cutoffs observed, there is a 206% chance they will depart in the following semester. The same goes for the College of Natural Sciences & Mathematics and the College of Arts & Letters, with a likelihood of departure at 133% and 97%, respectively. These comparisons are against the baseline college

variable *CollegeDummyHHS*, enrollment in the College of Health & Human Services. Again, these figures do not necessarily mean these colleges are failing their students, but rather it could be that these colleges are too rigorous for some students; there is a need for more student support; or there is a disproportionate number of vulnerable students enrolled in these colleges. Next, the variable for academic probation (*GPA19_199*), the focus of this study, shows a 90% odds ratio percent, meaning that for a student within the observed GPA cutoffs, landing on academic probation nearly doubles the likelihood they will depart in the following semester, as compared with a similar student not on academic probation.

The literature reviewed points to several reasons why students depart after academic probation, ranging from lack of preparedness (Earl, 1988; Tinto, 1993, Tromley, 2001) to the tone and language of the academic probation notification letter (Chipman, 2016). An important take here is the simple fact that academic probation does have a statistically significant effect on student departure and therefore deserves close consideration, especially when implementing institutional policies, such as measures for student retention. This finding is also useful to student counselors and academic advisors who can tailor their services to better serve and support their students on academic probation. The last positive variable (*TermElapsed*) is interpreted as, for students within the observed GPA cutoffs, there is a 57% increase in the likelihood of departure for each additional term that they have completed. An explanation for this outcome could be that for a student who has been near the academic probation threshold multiple semesters,

having been within this range too long and finally crossing the academic probation threshold pushes the student to depart.

The logistic regression also generated three statistically significant variables with negative odds ratio percentages. For the variables *HispanicDummy* (Hispanic students), *AsianDummy* (Asian students) and *FroshSemiLCOMDummy* (Freshman Seminar Learning Community), the negative odds ratio percent represents a positive outcome. Students in these categories, and within the observed GPA range, have a higher chance they will persist in the following semester when compared to their baseline counterparts. This means that Hispanic students have a 50% higher probability of continuing their education in the following semester when compared to their white peers. The same goes for Asian students, who have a 46% higher likelihood of persistence to the following semester than do white students. This particular finding contradicts the literature reviewed, which highlighted the vulnerabilities of minority students and their propensity for departure (Huston, 2006; Kamphoff, Huston, Amundsen, & Atwood, 2007; Tovar & Simon, 2006). Tera J. Yosso's (2005) work however does support this finding by introducing what she refers to as community cultural wealth. By this notion, Hispanic and Asian students in this study show a higher probability of persistence because their cultural background and community has instilled in them a strong sense of resiliency and ability to overcome challenges that would otherwise push them to depart. Moreover, my analysis also finds that students who participate in Freshman Seminar Learning Communities have a 40% higher likelihood of persistence in the following semester than those who do not participate in any freshman seminar. There exists a plethora of research

which highlights the success of learning communities, especially when considering outcomes for vulnerable populations, such as students on academic probation (Pittendrigh, Borkowski, Swinford, and Plumb, 2016). These programs provide robust and individualized services to students that potentially support academic probation students and encourage them to persist. One thing to consider however is that because students self-select to enroll in these programs, the findings in my study could possibly be the result of self-selection bias. This type of statistical discrepancy occurs individuals select themselves into a group and create a biased sample. In this particular case, the resiliency measured by the *FroshSemiLCOMDummy* variable could be the result of a high number of resilient students self-selecting to join the Freshman Seminar Learning Community, rather than participation in Learning Community generating resiliency in these students.

In addition, while my study did not find statistical significance for interaction variables i.e. two combined variables like *EOPGPA19_199*, meaning a student participant in EOP who lands on academic probation, it is important to consider the relationships of these type of influential factors. For example, both of these variables showed a relatively high probability for departure, and although there is no statistical significance when combined, the fact that they influence departure could serve as a tool for administrators and students services personnel to support a student who is both in EOP and on academic probation.

Comparing Findings to Other Research

Studies conducted by Fletcher and Tokmouline (2010) and Sanders, Philip, and Oreopoulos (2008), also looked at the effect of academic probation on student performance measures and found similar outcomes. Fletcher and Tokmouline (2010), for example, found that although academic probation provided a small boost in GPA in the following semester after receiving academic probation, most of this effect faded over time. Using regression discontinuity analysis on longitudinal data from four universities in Texas, they find that by the end of their second year, a student who received academic probation at the end of their first semester had slightly higher GPAs of 0.03-0.1 points. This effect however fades out by the end of the third year and is either zero or possibly negative by the 4th year for all schools. In comparison, my study finds no statistical significance between academic probation and academic performance in the following semester. Both studies align with the notion that academic probation has no lasting effect on student academic performance.

Furthermore, my study affirms the findings Sanders, Philip, and Oreopoulos (2008), who also found that academic probation increases the likelihood of student departure. Using regression discontinuity analysis on longitudinal data from three campuses at a large Canadian university to test the causal effect of academic probation, their study finds that for students who land on academic probation at the end of the first year, the probability that a student leaves the university increases by 2.2 to 2.7 percentage points, or by more than 50% of the control mean. In comparison, my study finds an almost doubled effect of academic probation; I find that academic probation increases the probability of departure by 90% when compared to the control mean.

These two studies are the only available research that teases out the effect of academic probation on student academic performance and departure.

Policy Implications and Recommendations

The findings in my study present serious policy implications for Sacramento State and institutions of higher learning in general. Understanding the role that academic probation plays in student departure is critical to improving retention rates at Sacramento State. My analysis shows that academic probation does not improve the academic performance of students, but does have a detrimental effect on student retention. As mentioned above, I found that students, between the cutoffs observed, who land on academic probation are almost twice as likely dropout of Sacramento State in the following semester than students in the similar GPA range who do not receive academic probation. This statistic alone is subject for concern.

The literature reviewed points to several effective strategies and policy changes that supports students through the probation process. Some of these focus on supporting first-year in college students, while others offer prescribed and even mandated services to students on academic probation. Colleges and universities should also consider the value (or lack of) of maintaining an academic probation policy. The question then, is not how to best address the negative externalities caused by academic probation, but why continue using an archaic academic policy that holds no value? I further discuss these implications below.

First-Year Programs & Learning Communities

In general, colleges and universities can benefit from supporting entering-students with successfully transitioning to college and developing essential skills and strategies for academic success. Adele Pittendrigh, John Borkowski, Steven Swinford, and Carolyn Plumb (2016), for instance, found that students who participated in first-year seminars showed higher rates of persistence and persistence was almost twice as high for students considered at-risk. My analysis also finds that students who participate in learning communities have a higher probability to persist in the following semester than those who do not. While Sacramento State already has a number of first-year programs and learning communities, because of how critical the first-year can be, it would benefit the campus to require these services for all incoming freshman. This of course is keeping in mind the issue of selection-bias discussed earlier. A first-year engagement program serves as a preventative measure that can potentially reduce the number of students that land on probation, and in effect, reduce the number of students who dropout.

Intervention Programs

In addition to preventative measures like the use of first-year programs, Sacramento State can decrease then number of students who dropout after academic probation by implementing an intervention process for students on academic probation. While the university currently offers support options to students on academic probation, such as academic advising and counseling, the literature reviewed highlights the success of more intensive and comprehensive support and intervention measures for students on academic probation. Of particular interest, is the use of required steps for students to

exiting the academic probation status, such as required seminars, workshops, and or counseling appointments, required enrollment in a success course, and required points of contact until the student successfully completes academic probation by reaching a GPA above the set standard. The University of Southern California, for example, uses an intrusive Appreciative Advising framework that has shown positive results in retaining students and helping them overcome academic probation (Butler, Blake, Gonzalez, Heller, and Chang, 2016). Under this academic probation policy, students who land on academic probation are required to meet with a specialized academic probation advisor twice per semester and are also encouraged to seek academic advising from their respective departments. Researchers found that the university experienced a 50% drop in students dismissed through the academic probation process after implementing this new policy (Butler, Blake, Gonzalez, Heller, and Chang, 2016). A required process for students on academic probation at Sacramento State could similarly reduce the number of students who depart after receiving academic probation.

Reconsider the Use of Academic Probation

If academic probation has no statistically significant effect on academic performance, and is moreover a trigger for departure to a significant number of students, why keep it as a policy measure? This question is likely at the core of this dilemma. The answer however is complex and intersects at various levels of governance, including local, state and federal. Colleges and Universities receive state and federal funding that is typically dependent on measurable student academic outcomes, such as GPA. Universities also receive tuition payments from the students they enroll; obviously, the

more students a university enrolls, the more revenue it generates. Therefore, it is in the interest of the institution, politically and financially, to track students' academic performance and set a measurable GPA standard. This standard categorizes students as achieving, failing, or in an academic probation range. An institution that can showcase a significant number of achieving students continues to receive government funding and maintains a market demand for enrollment. That need for categorization and student tracking could be the reason why institutions of higher learning continue to uphold the academic probation policy. The fact that colleges and universities are deeply bureaucratic systems is also a potential factor that has maintained an archaic policy like academic probation. Nonetheless, it may benefit students at Sacramento State if the university reconsiders the use of academic probation.

Limitations and Future Research

My study used a robust data set and appropriate methodology to find statistical significance and reject the null-hypothesis. There are certain limitations however that could have strengthened the outcomes of my analysis. Of particular importance is the length of years observed. The data set I used included four years of longitudinal student data. Although this is a considerable time range for a study of this nature, I believe an increase in the years observed could potentially show stronger and more accurate results. Moreover, while this study sets a number of controls to try and tease out the effect of academic probation, it is difficult to account for all factors that influence student departure. This is in part due to the nature of student departure and how individualized this experience can be. Some students may choose to leave the university because they

want to work, have to care for a sick family member, are depressed, do not like their roommate, or decide college is not for them, there are endless possibilities as to why a student decides to leave the university. Therefore, it is difficult to say academic probation is causing student departure. Future research on this issue could set a mixed-methods experiment that combines qualitative and quantitative analysis. Researchers can use statistical analysis with logistic regressions and compare these findings to outcomes from student, counselor, and faculty surveys to get a comprehensive perspective on the impact of academic probation on student departure.

Concluding Thoughts

The use of academic probation policies in higher education has been a common practice for decades. Most colleges and universities employ an academic probation policy by which a student who falls below the academic standard (typically 2.0 GPA) receives an academic probation status. Not much attention has been paid to how this academic probation status impacts the students' academic performance or persistence (departure). My study found that for the typical student at Sacramento State, between the GPA cutoffs 1.9-2.1, who lands on academic probation, not only is there no statistically significant effect on their academic performance (+/-) in the following semester after receiving academic probation, but they are more than twice as likely to drop out of the university, when compared to their peers on the same GPA who are above the academic probation threshold (2.0 GPA). This contradicts the prevalent narrative that academic probation is an institutional policy intended to “wake-up” students and motivate them to achieve. What I find, is that the wake-up call is not working, and what is more alarming, is that

not only is this policy not working as intended, but it potentially triggers the departure of some students.

Sacramento State, and colleges and universities in general, can support their students on academic probation by providing preventative measures to entering students such as first-year experience programs, learning communities, and year-long support that keeps students out of academic probation. Additionally, these institutions can alleviate the impact of academic probation for students who land on academic probation by implementing prevention policies and programs that support students through and out of their academic probation status. Lastly, and I believe more importantly, colleges and universities should examine how academic probation policies impact their students and reconsider whether this archaic measure is worth keeping.

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