Modeling College Enrollment Decision: A Case Study of the University of Arizona

by

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STATEMENT BY AUTHOR

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ABSTRACT

The research objective is to estimate and explain the likelihood of a student enrolling at the University of Arizona. Predictors of enrollment choice are assessed through Probit models using institution-level data. These models also shed light on what can be done to improve or exceed the 36% enrollment average yield during the years 1999 to 2009 in study. Student enrollment choice is analyzed as a function of student's state of residency, geographic regions and distance from home (e.g. resident, non-resident, West, MidWest), demographics (e.g. gender, ethnicity), student's academic attitudes (e.g. High School GPA, SAT), high school characteristics (e.g. public, private), and college characteristics (e.g. UA Honors). Estimates correspond with expect results on college choice based on proximity to home, cost and financial aid. For example, non-resident students are less likely to enroll than resident students and offering merit award has positive effect on enrollment choice at the University of Arizona.

CHAPTER ONE

INTRODUCTION

Background and Setting

Each year millions of high school graduates make decisions about whether to continue their education, and if so, where to apply and enroll. From a student point of view choosing to go to college, being chosen by a college, and the final decision to enroll represent major challenges. Students weigh alternatives and eventually choose to enroll in one of the institutions included in their choice set. On the other hand, universities want to plan and forecast their enrollment more effectively, and they want to influence the college going decision-making process of desired students. The study of college choice behavior is of great practical importance for administrators in promoting greater effectiveness in these two areas. (Paulsen, 1990).

More students are now sending out a greater number of applications as they shop around for the best academic and student aid opportunity. According to the College Board, high school graduates apply on average between 5 and 8 colleges and they are admitted on average between 3 to 5 colleges from their choice set. After the admissions decision, students ultimately matriculate to a college that is a good fit and they can afford.

Competition among colleges for student enrollment has increased over the years. Colleges and universities are being asked to fund more of their on budget through tuition revenues. Increased competition for and reliance upon student dollars has caused enrollment management at universities to pay considerable attention to developing more effective student enrollment strategies.

The term enrollment management refers to the ability of institutions of higher education to exert more influence over the number and characteristics of new students. Organized by

strategic planning and supported by institutional research, enrollment management activities concern student college choice, transition to college, student attrition and retention, and student outcomes (Don Hossler, et al.,1990).

Strategic Enrollment Management core concepts include establishing clear goals for the number and types of students needed to fulfill the institutional mission, determining, achieving and maintaining optimum enrollment, promoting academic success, enabling effective financial planning, and creating a data-rich environment to inform decisions and evaluate strategies (Bontrager, 2004).

While trying to tailor classes of freshmen, enrollment management must select from a cohort of applicants to fulfill the requirements of each program. However, not all of the admitted students will choose to enroll in their institution. It is of great practical importance for enrollment management to estimate the likelihood of new student enrollment.

The study of the college choice behavior of individual students (micro level) indicates the ways in which environmental, institutional, and student characteristics affect a student's choice about whether or not to attend college and which college to attend. In order to assist enrollment management and decision makers, researchers have developed extensive studies and literature on predictors of college enrollment decision. The work of Chapman (1981) provides a wider view of factors influencing traditional age (18-21) prospective students other than the classical financial aid factor directed to public policy formulation rather than institutional administration. The author states that the influence of significant persons, the fixed characteristics of the college, and institution's own efforts to communicate with prospective students are the main factors influencing student college choice. Many have emphasized student's academic ability, individual preferences and demographic attributes and how these factors affect enrollment decision. Others

emphasize college policy variables such as financial aid packets and tuition as key predictors of enrollment for particular groups of admitted students. Still others have focused on the impact that social issues and family have on student college choice. In recent years, the work of Kotler et al. evaluates student's college choice from a marketing perspective. The authors acknowledge that like public sector organizations, educational institutions must be concerned with nonmonetary incentives and decinsentives that may influence consumer's attitudes about products. For educational organizations, the nonmonetary intangibles are often critical, and factors such as prestige and reputation, branding, convenience for local markets, and trust are critical to successful postsecondary educational marketing. Understanding how to match communication strategies with market segment needs is fundamental. Despite the increase number of studies examining student college enrollment decision, there is still a dearth of information about the correlation of factors and their contribution to enrollment outcome. Therefore, the existing literature remains limited in its ability to provide a broad and comprehensive understanding on factors and their correlation to predict the likelihood of college enrollment.

Need for Study

College choice decision-making is important for the student and also has implications for institutional policy. A student's decision to go to college and the college choice he makes strongly influences his or her professional career, and there is evidence to indicate that the type of postsecondary education a student completes yields differential outcomes (DesJardings et al., 1999). Institutions can benefit from student college choice modeling by developing market strategies designed to attract students with desired academic and personal characteristics. Additionally, institutions can use the results to effectively target limited financial aid resources. If used effectively, studies of college choice can provide valuable information in developing

marketing, recruitment, and retention strategies (Fuller et al., 1982).

In Aud et al. (2010) report, trends in enrollment are reported across all levels of education. As the authors assert, enrollment is a key indicator of the scope of and access to educational opportunities and a basic descriptor of American education. Changes in enrollment have implications for the demand for educational resources such as qualified faculties, physical facilities, and funding levels, which are required to provide high-quality education for our nation's students. Enrollment at public 4-year institutions increased by 23 percent between 2000 and 2008 (from 4.8 to 6.0 million) and is projected to be 7.0 million students in 2019. Student enrollment decisions have further implications than enrollment management and decision makers reaching their enrollment goals. Companies tend to locate where talent is available. From the view of human capital theory, education is seen as an investment to improve expected future real income and employment opportunities. Fast-growing industries, including those in computers, biomedicine, and health care are thriving in part because they have smart, educated people on their staff. Studies by the Pew Center of the States (2011) found that factors previously considered as determinant to company locations such as low costs, low taxes and little regulation are not nearly as important as talent in the last few decades. As a result, college administrators and government officials are concerned about the economics of college student enrollment choice. First, each additional out-of-state student represents and additional source of revenue, through a higher tuition price. This additional source of revenue is particular important to keep average costs low and to overcome the declining in government subsidies and large budget cuts in recent years. Second, declining in enrollment level places a premium on recruiting out-of-state students. Furthermore, several studies in the 1980s found evidence that high school students are concerned about their ability to get high-paying jobs after college, and choose a college partly on

that basis (Perry and Rumpf, 1984). When these relationships are clearly understood, predictive modeling becomes highly important.

Every year universities spend significant amount of time, energy, and finances in the recruitment of students and the marketing of programs. Yet efforts such as these are typically not based on empirical research, and consequently research need to be done to tailor most effective recruitment strategies according to college goals. Limited pool of data exists relative to specific recruitment practices (e.g. high school visits, campus tours, number of college counselor-student interactions), which may influence a student's college choice.

In recent years, shifting in public-policy priorities by reducing subsidies for institutions of higher education have forced colleges and universities to fund their budgets through tuition revenues. Competing for students, branding college's name, and targeting limited financial aid resources are clear major concerns for enrollment management. In order to meet their goals, the primary task of colleges is to determine the needs and wants of target markets, and to satisfy them (Keller, 2006).

In this highly competitive market for student's enrollment, universities must be able to accurately predict enrollments and effectively influence student college choice. Predictive models are tools used to assist enrollment management to developing effective student enrollment strategies to overcome possibility of reduced enrollment and budget deficits. The universities which survive will engage in aggressive and effective marketing campaigns, euphemistically referred to as recruiting efforts by higher education (Perry and Rumph, 1984)

Purpose and Objectives

The purpose of this study is to extend previous studies of college choice to the particular case of the University of Arizona. The objective is to assess the likelihood of enrollment and whether an admitted student chooses to enroll at the University of Arizona. Additionally, the objective is to assess factors that may be affecting students' decision to enroll. This study examines the predictive capability of the Probit modeling procedure based on the role and contribution from each available predictor and the interaction among some predictors. Although there is sufficient evidence in the literature that students consider costs when selecting a college, this study examines whether cost and distance from home have an impact on the probability that the student enrolls at the University of Arizona. According to the U.S Department of Education, undergraduate enrollment is expected to increase from 16.4 million students in 2008 to 19.0 million in 2019. Therefore, universities have to assess the following questions: how much enrollment do they have now, how much can they grow and how can they attract more prospective students to fulfill their enrollment expectations? The responses to the following questions are objectives that guide this study:

1. What factors predict the likelihood of student's to enroll at the University of Arizona?
2. Do ethnicity, gender, and academic ability affect college choice?
3. Controlling for these factors, what role does distance between home and college play in college choice?

Limitations of the Study

This study is restricted by the following limitations:

- Data limitations. The information on socio-economic status and financial aid is only available for 2007, 2008 and 2009 academic.
- Data on major selected by students admitted is not available.
- The study is limited to domestic freshman applicants from Arizona residents and out of Arizona (OOS) residents. International or transfer applicants are not accounted for in the data set.
- Data from the National Student Clearinghouse regarding the institution where student actually enrolled when admitted and not enrolled at the University of Arizona is not available. The National Student Clearinghouse maintains a comprehensive electronic registry of student records that provides a single, automated point-of-contact for organizations and individuals requiring timely, accurate verification of student enrollment, degree, and loan data.

CHAPTER TWO

REVIEW OF LITERATURE

Every year millions of students graduating from high school face the decision whether to continue to higher education. Many factors influence this decision.

Since the earliest 1960's researchers have conducted numerous studies of student college choice from different perspectives. Most of the earlier studies focused on aggregate student enrollment or macro level, as opposed to individual college choice. Micro-level studies shift the focus of research from national, state, and institutional enrollment amounts to the estimation of the probability that an individual student will choose a particular option (e.g. enroll/non-enroll).

Some representative studies of college enrollment choice are analyzed from the economic view of utility function (Rabin, 1998), market demand perspective (Paulsen, 1990), student characteristics and income (Weiler, 1994), financial aid (St. John, 1989, Arcidiacono, 2005), peer assessment of reputation (Bastedo, 2010), admissions selectivity (Schmitz, 1993), cultural and social network (Stewart, et. al., 2007).

The conventional definition of rational behavior usually holds that individuals have a well-defined set of preferences, and when faced with a set of choices, they will choose the option that maximizes their satisfaction (or utility). Rabin offered a utilitarian-based definition and he states:

"Economics has conventionally assumed that each individual has stable and coherent preferences, and that she maximizes those preferences. Given a set of options and probabilistic beliefs, a person is assumed to maximize the expected value of a utility function . . ." (Rabin, 1998).

There are few studies based on large sample of students representing diverse groups and interests, utilizing the above framework. Thus, the existing literature remains limited in its ability to provide a broad and comprehensive understanding of the college choice decisions of students desiring to attend large, public institutions like the University of Arizona.

Despite substantial investment in marketing and recruitment, these enrollment management activities are often not based on empirical research of the college choice process. From the point of view of neo-classical economic point of view, a college is a production unit. The University of Arizona provides a service of knowledge transfer and students are customers buying a service. Therefore, within this increasingly intense competition for students if institutions want to plan their enrollments more effectively, they must pay special attention to the college choice behavior of prospective students by considering the effects of student and institutional characteristics, by being more responsive to market demands, and by being more aware of the increasing importance of student recruitment (Paulsen, 1990).

Studies of college choice behavior suggest that the characteristics of students (e.g. race, gender, marital status, family income, parents' educational attainment and occupational status, academic ability and achievement), institutional characteristics (e.g. tuition, financial aid, home location, reputation, selectivity, special programs and curriculum); and contextual factors (e.g. parental encouragement, teacher encouragement and peers' plans) influence students' application decisions. Generally, these studies have found that as students' family income, educational aspirations, academic ability, achievement and parental education increase, students are more likely to choose high cost, highly selective, distant, private and four-year institutions (Weiler, 1994).

Financial aid has played an important role in promoting access to higher education. Empirical evidences show that all types of aid are effective in promoting access for minority students. The impact of the type of aid has different impacts however. St. John et. al. study findings also suggest that caution should be used when packaging aid for minority applicants. For blacks, grants had a stronger impact than loans in 1980 and 1982. And for Hispanics, grants were the only type of package that was significant in 1980. A paper by Arcidiacono addresses how changing the admission and financial aid rules at colleges like specifically removing race-based advantages, does affect black educational outcomes. Removing advantages in admissions substantially decreases the number of black students at top-tier schools, while removing advantages in financial aid causes a decrease in the number of blacks who attend college.

Much of the research on educational aspirations has found that individual-level factors such as a student's personal characteristics, family, socioeconomic background, social class, academic history, curriculum track placement, ability level, peer groups, and teachers, as well as numerous other social and cultural resources found in a youth's social network, influence the formation of aspirations (Stewart, et al., 2007).

Several studies have examined students' perceptions of important factors in the college selection process. Among these factors is college rank. Researchers have been interested in understanding the effects that rankings have on student behavior, especially college selection and choice. Bastedo and Bowman found that published college rankings have a significant impact on future peer assessments, independent of changes in organizational quality and performance and even of prior peer assessments of reputation. However, research evidence suggests that students base their college attendance decision less on an institution's specific rank (e.g. U.S. News and World Report) and more on its overall academic reputation or prestige (Hurtado, et al. 2006). In

the aggregate, these studies indicate that institutions with large enrollments and high SAT/ACT averages for entering freshmen receive the greatest prestige. Other studies at the undergraduate level conclude that two ‘‘inputs’’ - institutional size and admissions selectivity - are the primary drivers of reputation (Schmitz, 1993).

Analysis of data collected from admitted students on student characteristics and rating of the characteristics of a college and its competitiors allows a college to identify its competitors, assess its image, determine its market position compare to competitors, identify what determines matriculation choices, and identify student market segment by enrollment yield (Paulsen, 1990).

Given the availability of such information, the analytic strategy employed in this study allows to model more adequately the correlation among enrollment decisions and student's personal characteristics, academic achievements and geographic region. The development of an integrated model of student choice using applicant level-data at the University of Arizona is the tool used for this purpose.

CHAPTER THREE

DATA

The Data

The Office of Institutional Research and Planning Support at the University of Arizona provided the applicant level data for the academic years 1999 to 2009. These cross-sectional applicant-level historical data for 11 consecutives academic years from 1999 to 2009 are used in modeling enrollment decisions. Only domestic student applicants are used for the analysis. Transfer student applicants and international student applicants are not used in the analysis. A data corresponds only to freshman applicants.

Transfer and international applicants are important sources of students for the University of Arizona (see table 3.5). The reason to exclude these important cohorts of applicants is due to the differences on admissions requirements and processing. For example, students attending community colleges do not generally submit standardized test scores (e.g. SAT, ACT) with their applications. On the other hand, international students or students with English as a second language are required to submit a standardized test scores called TOEFL. Additionally, the GPA is calculated differently from courses taken in community colleges or international institutions and conversions are required. Standardizing transfers and international applicant student variables that play a role in their admissions and matriculation would add measurements errors to the analysis.

The University of Arizona changed the way applicant data are collected in recent years. More applicant-level information is available for years 2007-2009 in the data set. These variables online application, and effective family contribution (EFC) used as a proxy for ability to pay. Federal Student Aid uses the data on student's Free Application for Federal Student Aid

(FASFA) to calculate and Effective Family Contribution (EFC). The EFC is an indicator of student's family financial strength to pay for education after high school. Colleges subtract student's EFC from the total cost of attendance. The result is student's financial need. The EFC is not the amount of money that student's family must provide. Rather the EFC is an index that colleges use to determine how much financial aid (grants, loans, or work-study) student would receive if he were to attend their school. To take advantage of this additional set of variables, a separate analysis is done for 2007-2009 years.

Names and definitions of the variables in the study are given in Table 3.1. The dependent variable is binary (e.g. 1 if the student enrolled at the University of Arizona and 0 otherwise). The effective sample included 183,627 admitted students for 11 consecutive academic years from 1999 to 2009. Every year enrollment managers are interested in determining how many students from this pool of admitted students would actually enroll at the University of Arizona.

Variables hypothesized to affect enrollment decisions in this study include students' personal and demographic characteristics (gender and ethnicity), academic performance (GPA), standardized test scores (ACT, SAT), high school characteristics (public high school, private high school, charter school, home school), residency (resident of the State of Arizona, non resident), and socio-economic characteristics (first generation student, dependent, independent, financial aid amount offered).

Descriptive statistics for the two datasets are presented in tables 3.2 and 3.3 for years 1999-2009 and 2007-2009 respectively. From these tables, we observe that mean values are similar for most variables in both data sets. In the case of the variable gender the mean value for female in the 11 years data set is 0.523 and for the 3 years data set is 0.546. Similarly, we observe means comparable for some variables such as ethnicity, GPA, and high school type. On

the other hand, some variables have shown changes during the last three years of the study (2007-2009). The mean for Hispanic shows a slight increase from 0.128 to 0.156 which represents an approximately 22% rate of growth over the time period. The mean of the variable AI, which measures the likelihood of academic success, also shows a small increase for the last three-year study period of approximately 1.4%. Similarly ACT shows an increase of approximately 1.1%. Students who are the first in their family to attend school, represented by the mean of the variable FirstGen also shows and increase of approximately 27%. The largest increase however, is observed in the mean of the variable UA Honors which changes from 0.0377 to 0.1210. The change in the mean of UA Honors represents an approximately 221% increase in 2007-2009 academic years. Statistical test will provide more reliable measures for these preliminary observations.

The pattern of change in high school graduates varies widely by state and region. According to the U.S. Department of Education, National Center of Education Statistics (2011), at the national level, the number of high school graduates increased nationally 27 percent between 1994-1995 and 2006-2007, the last year of actual data. A further increase of 1 percent is expected between 2006-2007 and 2019-20. Public schools are expected to have an increase in high school graduates, and private schools are expected to have a decrease. Increases are expected in the West and South, and decreases are expected in the Northeast and Midwest. Table 3.4 and graph 3.1 illustrate the relative magnitude of change in the number of high schools graduates from Arizona and USA for years 1999-2009. The University of Arizona enrollment numbers are added to the table for the same time period.

High School graduates at national level increased 18 percent from 1999 to 2007 while the percentage of USA high school graduates decreased 2 percent from 2007 to 2009 as can be

observed from graph 3.1. In Arizona, the movement on high school graduates differs from the national trend. The effective increase rate on high school graduates in Arizona is 53 percent during the same period of time 1999 to 2007 while the percentage of high school graduates decrease 4 percent from 2007 to 2009.

At the University of Arizona enrollment rate increased 29 percent from 1999 to 2007 and continued increasing 6 percent in the next two years until 2009. However, enrollment rate at the University of Arizona is relatively steady regardless the number of students graduating of public high schools per academic year. For example, from 2001 to 2002 high school graduates in Arizona rose 6 percent while enrollment at the University of Arizona fell 2 percent. Similarly, from 2003 to 2004 high school graduates in Arizona increase 31 percent while enrollment at the University of Arizona decreased 4 percent.

Observed changes in freshmen-matriculation at the University of Arizona from years 1999 to 2009 show no evidence of correlation in matriculation at the University of Arizona and high school graduates whether at the national or Arizona level. Further analysis may be needed to depict the effect of high schools graduates in freshmen matriculation level at the University of Arizona.

Table 3. 1 Definition of Variables

Variable	Description
AcadYear	Academic Years from 1999 to 2009
AZResident	Residency = State of Arizona
Nonresident	Residency = Non Arizona Resident
Female	Gender Female
Male	Gender Male
Africam	Ethnicity= African American
Asian	Ethnicity= Asian / Pacific Islander
Hispanic	Ethinicity = Hispanic / Latino
Nativam	Ethnicity = Native American
Otherace	Ethnicity = Other race/ multi-racial / unknown
White	Ethnicity = Caucasian / White
FirstGen	First Generation to attend College
Depend	Whether the student depends economically on parents
GPA	High School GPA
ACT	Standarized Test ACT
SAT	Standarized Test SAT
AI	UA Academic Index
PrivateHS	High School Type = Private High School
PublicHS	High School Type = Public High School
CharterHS	High School Type = Charter School
HomeSch	High School Type = Home School
UAHonors	Whether student was admitted to UA Honors College
MeritAmt	Whether a merit amount/scholarship was offered
MidWest	States: IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI
NorthEast	States: CT, ME, MA, NH, NJ, NY, PA, RI, VT
South	States: AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV
West	States: CA, CO, ID, MT, NV, NM, OR, UT, WA, WY
Otheregion	includes: AA, AE, AK, AP, AS, GU, HI, MP, PR, VI
Arizona	State: Arizona
ResidentTuitionIndx	UA Resident Tuition and Fees index
NonresidentTuitionIndx	UA Nonresident Tuition and Fees index
UATuitionIndx	UA Tuition and Fees index (resident and nonresident)
Orientation	Whether student attended UA Orientation
OnLineAppl	Whether student applied Online
EFC	Expected Family Contribution (proxy for ability to pay)

Table 3. 2 Variable descriptive statistics for academic years 1999 to 2009

Variable	N	Mean	Minimum	Maximum	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
AcadYear	183627	2004	1999	2009	3	2004	2004
AZresident	183627	0.5000	0	1	0.5000	0.4980	0.5020
Nonresident	183627	0.5000	0	1	0.5000	0.4980	0.5020
Female	183627	0.5230	0	1	0.4990	0.5210	0.5260
Male	183627	0.4770	0	1	0.4990	0.4740	0.4790
Africam	183627	0.0344	0	1	0.1820	0.0336	0.0352
Asianam	183627	0.0601	0	1	0.2380	0.0590	0.0612
Hispanic	183627	0.1280	0	1	0.3340	0.1270	0.1300
Nativeam	183627	0.0231	0	1	0.1500	0.0224	0.0237
Otherace	183627	0.0810	0	1	0.2730	0.0798	0.0823
White	183627	0.6730	0	1	0.4690	0.6710	0.6750
FirstGen	183627	0.0280	0	1	0.1650	0.0273	0.0288
depend	183627	0.1700	0	1	0.3750	0.1680	0.1720
GPA	183627	3.3000	0.874	4	0.4500	3.2980	3.3020
ACT	72980	24	2	80	4	24	24
SAT	127184	1121	450	1600	161	1120	1122
AI	172265	180	1	339	47	180	180
PrivateHS	183627	0.0297	0	1	0.1700	0.0289	0.0304
PublicHS	183627	0.9620	0	1	0.1900	0.9620	0.9630
CharterHS	183627	0.0079	0	1	0.0883	0.0075	0.0083
HomeSch	183627	0.0009	0	1	0.0304	0.0008	0.0011
UAHonors	183627	0.0377	0	1	0.1900	0.0368	0.0386
MeritAmt	183627	0.8710	0	1	0.3350	0.8700	0.8730
MidWest	183627	0.0855	0	1	0.2800	0.0842	0.0868
NorthEast	183627	0.0632	0	1	0.2430	0.0621	0.0643
South	183627	0.0649	0	1	0.2460	0.0638	0.0661
West	183627	0.2780	0	1	0.4480	0.2760	0.2800
Otheregion	183627	0.0132	0	1	0.1140	0.0127	0.0137
Arizona	183627	0.4950	0	1	0.5000	0.4930	0.4970
ResidentTuitionIndx	183627	0.2100	0.166	0.268	0.0300	0.2100	0.2100
NonresidentTuitionIndx	183627	0.7370	0.679	0.871	0.0526	0.7370	0.7370
UATuitionIndx	183627	0.4740	0.166	0.871	0.2680	0.4720	0.4750

Table 3. 3 Variable descriptive statistics for academic years 2007 to 2009

Variable	N	Mean	Minimum	Maximum	Std Dev	Lower 95% CL for Mean	Upper 95% CL for Mean
AcadYear	57345	2008	2007	2009	1	2008	2008
AZresident	57345	0.4710	0	1	0.4990	0.4670	0.4760
Nonresident	57345	0.5290	0	1	0.4990	0.5240	0.5330
Female	57345	0.5460	0	1	0.4980	0.5420	0.5500
Male	57345	0.4540	0	1	0.4980	0.4500	0.4580
Africam	57345	0.0430	0	1	0.2030	0.0414	0.0447
Asianam	57345	0.0695	0	1	0.2540	0.0674	0.0716
Hispanic	57345	0.1560	0	1	0.3620	0.1530	0.1590
Nativeam	57345	0.0293	0	1	0.1690	0.0279	0.0306
Otherace	57345	0.0212	0	1	0.1440	0.0200	0.0224
White	57345	0.6810	0	1	0.4660	0.6780	0.6850
FirstGen	57345	0.0356	0	1	0.1850	0.0341	0.0371
depend	57345	0.5440	0	1	0.4980	0.5400	0.5480
GPA	57345	3.2890	1.25	4	0.4450	3.2850	3.2920
ACT	26175	24	2	36	4	24	24
SAT	43226	1117	460	1600	163	1116	1119
AI	53798	183	6	339	48	182	183
PrivateHS	57345	0.0304	0	1	0.1720	0.0290	0.0318
PublicHS	57345	0.9590	0	1	0.1980	0.9580	0.9610
CharterHS	57345	0.0103	0	1	0.1010	0.0095	0.0111
HomeSch	57345	0.0015	0	1	0.0387	0.0012	0.0018
UAHonors	57345	0.1210	0	1	0.3260	0.1180	0.1230
MeritAmt	57345	0.5880	0	1	0.4920	0.5840	0.5920
MidWest	57345	0.0829	0	1	0.2760	0.0807	0.0852
NorthEast	57345	0.0781	0	1	0.2680	0.0759	0.0803
South	57345	0.0665	0	1	0.2490	0.0644	0.0685
West	57345	0.2890	0	1	0.4530	0.2850	0.2920
Otheregion	57345	0.0118	0	1	0.1080	0.0109	0.0127
Arizona	57345	0.4720	0	1	0.4990	0.4680	0.4760
ResidentTuitionIndx	57345	0.2410	0.2240	0.2680	0.0191	0.2410	0.2410
NonresidentTuitionIndx	57345	0.7910	0.7210	0.8710	0.0606	0.7900	0.7910
UATuitionIndx	57345	0.5320	0.2240	0.8710	0.2780	0.5290	0.5340
dorientation	57345	0.4550	0	1	0.4980	0.4510	0.4590
OnLineAppl	57345	0.9460	0	1	0.2250	0.9450	0.9480
EFC	57345	0.4380	0	1	0.4960	0.4340	0.4420

Table 3. 4 National and Arizona Numbers for High School Graduates of Public Schools and Number of Matriculates at the University of Arizona Per Academic Years 1999 to 2009

	[*]	[*]	[**]
Year	USA HS Graduates	AZ HS Graduates	UA Enrollment
1999	2,553,844	38,304	5,098
2000	2,621,534	46,733	5,526
2001	2,719,947	47,175	5,949
2002	2,753,438	49,986	5,808
2003	2,799,250	45,508	5,958
2004	2,815,544	59,498	5,725
2005	2,892,351	54,091	5,974
2006	3,011,060	55,954	6,009
2007	3,004,570	58,430	6,569
2008	2,991,310	57,230	6,709
2009	2,937,170	56,240	6,966

SOURCES: [*] U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Nonfiscal Survey of Public Elementary/Secondary Education," 2002–03 through 2007–08; and State Public High School Graduates Model, 1980–81 through 2006–07.(This table was prepared January 2010) http://nces.ed.gov/programs/projections/projections2019/tables/table_14.asp
[**] The University of Arizona Office of Institutional Research and Planning Support (http://oirps.arizona.edu/). UA Fact Book

Graph 3. 1 National and Arizona Numbers for High School Graduates of Public Schools and Number of Matriculates at the University of Arizona Per Academic Years 1999 to 2009

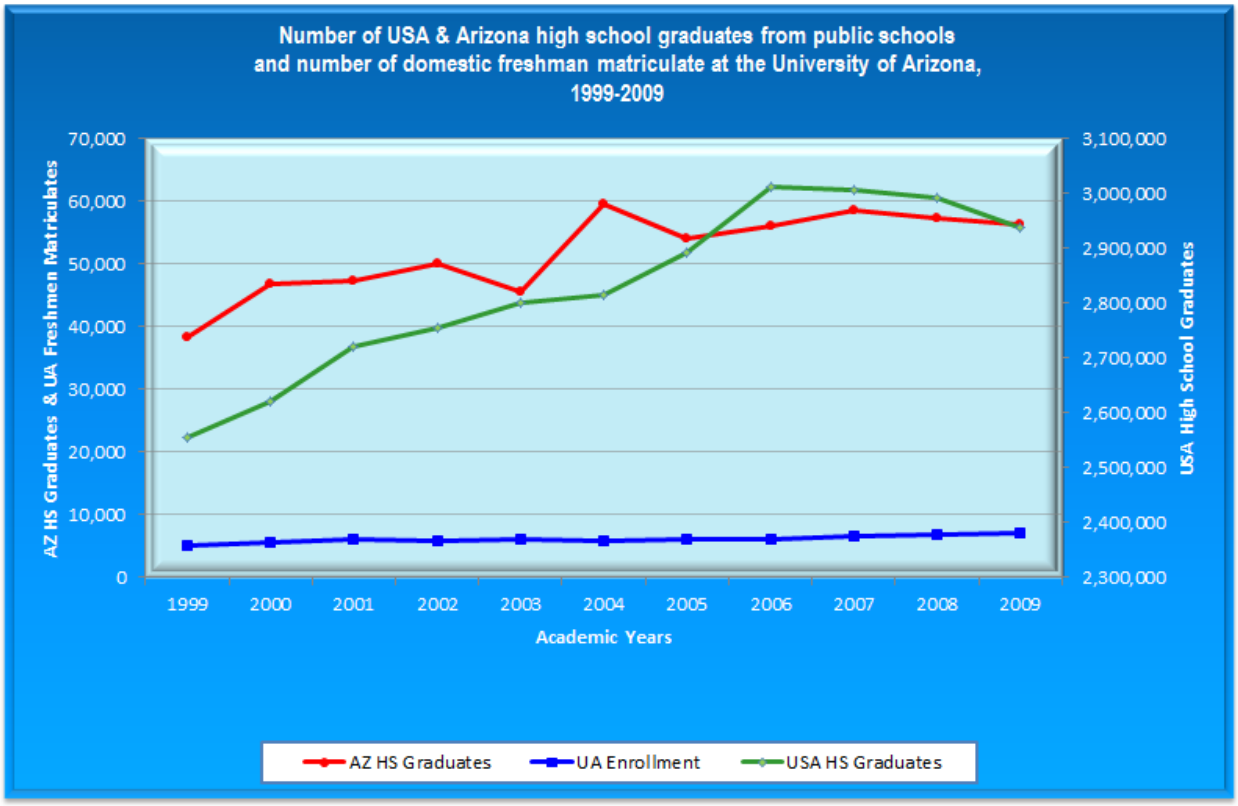


Table 3. 5 Undergraduate student enrollment at the University of Arizona, 1999-2009

Academic Year	Domestic Freshmen (numbers)	Transfers Enrollment (numbers)	International (numbers)	Total First Time enrollment
1999	5,098	2,140	1,115	8,353
2000	5,526	1,925	1,155	8,606
2001	5,949	2,086	1,233	9,268
2002	5,808	1,959	1,197	8,964
2003	5,958	1,845	1,125	8,928
2004	5,725	1,928	911	8,564
2005	5,974	2,007	834	8,815
2006	6,009	1,962	784	8,755
2007	6,569	1,913	805	9,287
2008	6,709	1,903	935	9,547
2009	6,966	1,912	980	9,858
Total Enrollment 1999-2009	66,291	21,580	11,074	98,945
Average	6,026	1,962	1,007	8,995
	(67%)	(22%)	(11%)	(100%)
Total Enrollment 2007-2009	20,244	5,728	2,720	28,692
Average	6,748	1,909	907	9,564
	(71%)	(20%)	(9%)	(100%)

Source: The University of Arizona. Office of Enrollment Research; Office of Institutional Research & Planning Support. Factbook 2008 and 2009. http://oirps.arizona.edu/UAFactBook.asp

Table 3. 6 The University of Arizona Average Enrollment Yield by SAT score level

AcadYear	Enrollment Status	SAT <800 Yield	800 <= SAT < 1000 Yield	1000 <= SAT < 1200 Yield	1200 <= SAT < 1400 Yield	1400 <= SAT <= 1600 Yield
1999	Enroll	99%	100%	100%	100%	99%
2000	Enroll	90%	96%	97%	97%	98%
2001	Enroll	49%	47%	40%	35%	36%
2002	Enroll	47%	41%	37%	32%	34%
2003	Enroll	40%	41%	38%	37%	34%
2004	Enroll	41%	38%	35%	33%	34%
2005	Enroll	45%	46%	41%	36%	33%
2006	Enroll	57%	53%	45%	40%	35%
2007	Enroll	68%	58%	49%	41%	33%
2008	Enroll	67%	56%	48%	41%	36%
2009	Enroll	49%	44%	41%	36%	30%
	Average yield	59%	56%	52%	48%	46%

Graph 3. 2 The University of Arizona Average Enrollment Yield by SAT scores levels, 1999-2009

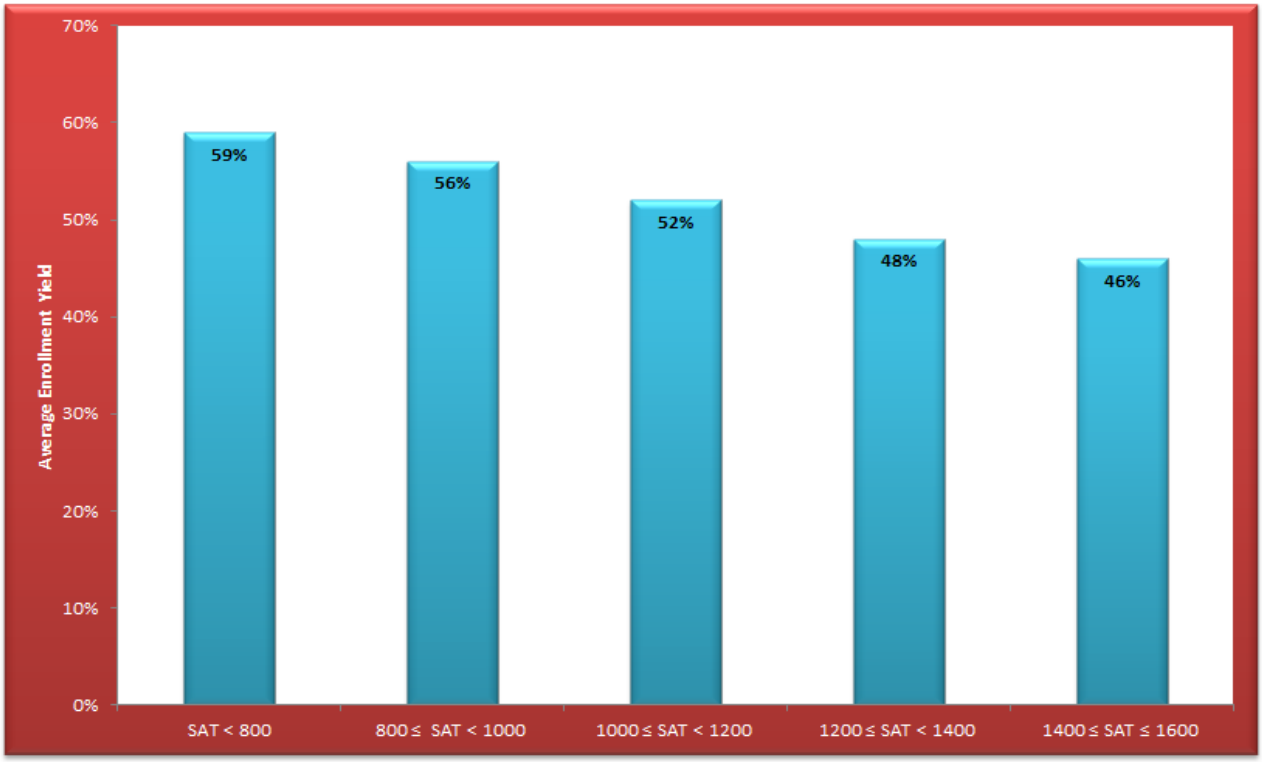


Table 3. 7 The University of Arizona Average Enrollment Yield by High School GPA

Academic Year	Enrollment Status	GPA < 2.0 Yield	2.0 <= GPA < 2.5 Yield	2.5 <= GPA < 3.0 Yield	3.0 <= GPA < 3.5 Yield	3.5 <= GPA <= 4.0 Yield
1999	Enroll	74%	51%	39%	34%	35%
2000	Enroll	63%	49%	37%	32%	34%
2001	Enroll	57%	48%	40%	33%	36%
2002	Enroll	53%	50%	38%	31%	34%
2003	Enroll	44%	46%	37%	30%	37%
2004	Enroll	49%	49%	33%	30%	36%
2005	Enroll	40%	53%	42%	35%	38%
2006	Enroll	71%	52%	44%	40%	44%
2007	Enroll	82%	52%	48%	45%	47%
2008	Enroll	82%	52%	46%	44%	47%
2009	Enroll	60%	42%	35%	34%	40%
Average Yield		61%	49%	40%	35%	39%

Graph 3. 3 The University of Arizona Average Enrollment Yield by High School GPA, 1999-2009

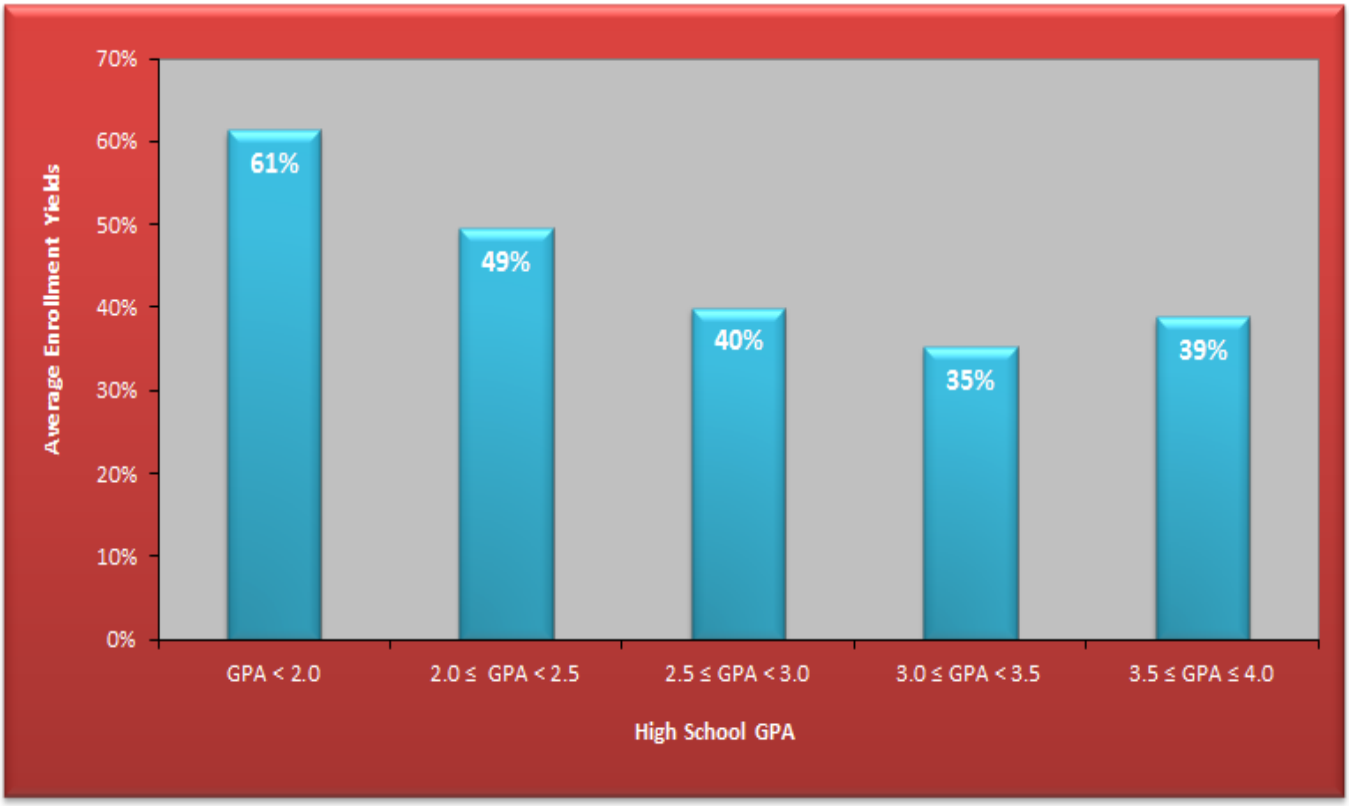
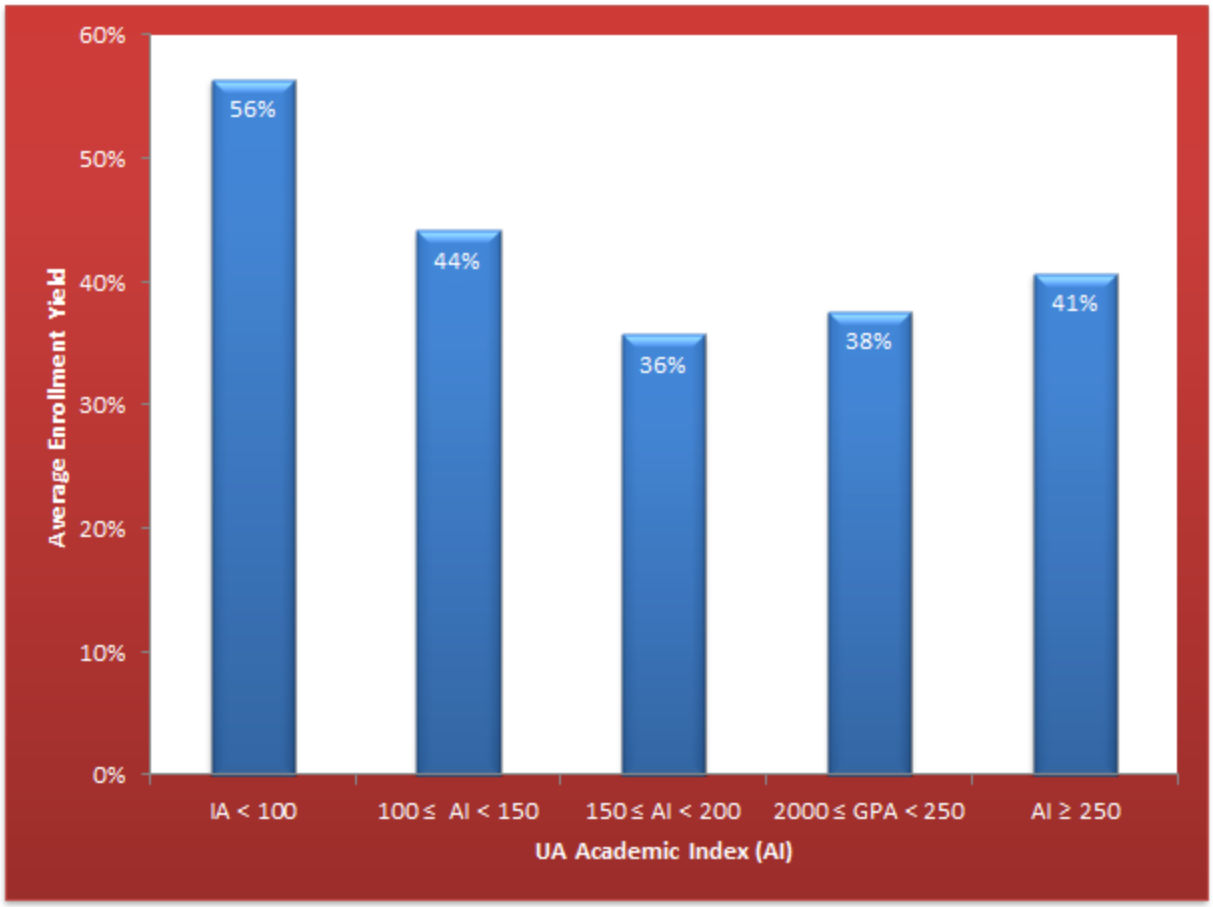


Table 3. 8 The University of Arizona Average Enrollment Yield by AI

Academic Year	Enrollment Status	AI <100 Yield	100<= AI <150 Yield	150<= AI <200 Yield	200<= AI <250 Yield	AI > 250 Yield
1999	Enroll	53%	41%	33%	35%	40%
2000	Enroll	52%	41%	32%	33%	33%
2001	Enroll	53%	44%	33%	38%	42%
2002	Enroll	54%	43%	33%	32%	38%
2003	Enroll	45%	41%	31%	37%	46%
2004	Enroll	52%	38%	31%	34%	40%
2005	Enroll	56%	47%	35%	37%	40%
2006	Enroll	60%	48%	40%	41%	44%
2007	Enroll	73%	52%	45%	45%	42%
2008	Enroll	67%	50%	45%	44%	44%
2009	Enroll	54%	42%	34%	37%	40%
Average Yields		56%	44%	36%	38%	41%

Graph 3. 4 The University of Arizona Enrollment Yields by UA Academic Index (AI), 1999-2009



CHAPTER FOUR

RESULTS

According to the University of Arizona Fact Book (http://factbook.arizona.edu/), the university historically has admitted between 78 and 84 percent of all freshman applicants. This represents an average of 84 percent yield in freshman admissions during the 11 academic years (1999 to 2009) considered in this study. Furthermore, the University of Arizona has an enrollment rate between 34 and 42 percent. This represents an average of 36 percent freshman enrollment yield from 1999 to 2009. A total number of 183,916 freshman applicants were admitted from 1999 to 2009 (see table 4.1).

The University of Arizona performs a holistic review of student applications. The holistic review considers student's academic performance, standardized test scores achievement, student's community involvement, sports participation, and extra-curricular activities. Students are not required to submit SAT or ACT scores for the review of application and consideration for an admissions decision. However, the submission of at least one of the standardized test scores is highly recommended for consideration of awards, scholarship and for financial aid purposes.

Trends in domestic freshman applications, admissions and enrollment at the University of Arizona from years 1999 to 2009 are shown in graph 4.1. Freshmen applications and admissions counts moved almost parallel during these 11 years. They both increased at decreasing rate from 1999 to 2002. Then, applications and admissions show some gains in the next couple of years. They started increasing at an increasing rate from 2002 to 2003. Although the numbers show some improvement from 2005 to 2006, both variables are below 1999 levels. From 2006 to 2007 there was a significant improvement in applications and admissions. The following year 2008 the numbers of applications and admissions increased at a decreasing rate. Finally in from 2008 to

2009 applications and admissions increased at an increasing rate. On the other hand, enrollment numbers seems not to move along with movements in applications and admissions. Enrollment numbers increased at a decreasing rate from 1999 to 2001. However from 2001 to 2002, enrollment numbers dropped while applications and admissions were increasing. The following year 2003, there was a small gain in freshmen enrollment to reach the level of 2001. However in 2004, the number of students matriculated plunged to the level of 2000 while there were over 14 thousand more admitted freshmen than in 2000. The following year 2005, there was a modest gain in matriculation to bounce back and reach the level of 2003. The following years 2006 to 2009, the trend shows an increase in enrollment. However, it is not a steady increase in enrollment. Freshmen matriculation from to 2006 to 2007 increased at an increasing rate. After that from 2007 to 2008 freshmen matriculation increased at a decreasing rate. Finally, from 2008 to 2009 increased at an increasing rate.

Despite these abrupt changes in applications and admissions numbers, total freshmen enrollment shows a steady increase over the 1999-2009 period (see graph 4.1).

This study is limited to the assessment of the likelihood of student enrollment choice at the University of Arizona, it does not cover specific marketing, admissions and recruitment activities and enrollment strategies. However, it is through the process of academic market research and techniques that student enrollment behavior is studied from the perspective of individual institutions. One way to observe how marketing strategies at the University of Arizona compares to other peers institutions is by comparing enrollment yields for the 1999-2009 period. In this sense, data for two land grant colleges, Arizona State University (ASU) and Washington State University (WASU), are presented in tables 4.2 and 4.3 and figures 4.3 and 4.4.

Table 4.2 presents applications, admissions and enrollment numbers for the three universities while table 4.3 presents admissions and enrollment yields. The number of freshman applications received at Washington State University increased from 7133 in 1999 to 12478 in 2009. This represents a 75 percent increase in freshman applications in 11 years. Similarly, the number of freshman admitted increase from 6009 in 1999 to 9489 in 2009. This represents a 58 percent increase in freshman admitted. Following the same pattern, the number of freshman matriculated increased from 2728 in 1999 to 4183 in 2009. This represents a 53 percent increase in freshman matriculated in 11 years.

For Arizona State University data for the years 1999 and 2000 is not available. However, the 9 years trend from years 2001 to 2009 is similar to that of Washington State University. The trend shows an increase in applications, admissions and enrollment. The number of freshman applications received increased from 21821 in 2001 to 28394 in 2009. This represents a 30 percent increase. The number of freshman admitted increased from 16360 in 2001 to 25696 in 2009. This represents a 57 percent increase in freshman admitted. Similarly, the number of freshman matriculated increased from 6586 in 2001 to 9344 in 2009. This represents a 42 percent increase in freshman matriculated in 9 years.

At the University of Arizona the number of freshman applicants increased from 17700 in 1999 to 24625 in 2009. This represents a 39 percent increase in freshman applicants in 11 years. The number of freshman admitted increased from 14868 in 1999 to 19207 in 2009. This represents a 29 percent increase in freshman admitted. The number of freshman matriculated increased from 5098 in 1999 to 6966 in 2009. This represents a 37 percent increase in freshman matriculated.

We observe that at the three colleges the number of freshman applications received

increased. However the percentage is significantly greater at the Washington State University (75%), while at the University of Arizona is 39% and at the Arizona State University is 30%. On the other hand the number of freshman admitted students is similar at the Washington State University (58%) and the Arizona State University (57%), but is significant lower at the University of Arizona (29%). Similarly, the number of freshman matriculated during this period of time is significantly greater at the Washington State University (53%), and the Arizona State University (42%) than at the University of Arizona (37%).

Freshman admissions and enrollment yields are presented in table 4.3. Average admissions yields are similar at Washington State University and Arizona State University (78%) while at the University of Arizona is higher with an 84 percent average freshman admissions yields. However, the average freshman enrollment yield is significant lower at the University of Arizona (36%) while at the Arizona State University is 40 percent and at the Washington State University is 46 percent. Lower enrollment yield at the University of Arizona may be an indicator that applicant students perceive the University of Arizona as a less selective institution due to its high admissions rate compare to Arizona State University and Washington State University. Data from tables 4.2. and 4.3 are presented graphically in figures 4.3 and 4.4. Before continuing to examination of enrollment outcomes, it is important to mention that including the data from these two colleges is only intent as a point of reference to support outcome analysis in the present study, not as a benchmark.

Testing for differences in means:

To check for systematic differences in the enrollment yields among different groups of applicants, various t tests are performed. These results are presented in tables 4.4 – 4.7. These tests investigate whether the observed differences in the enrollment yields between the two

groups of applicants – for example residents and non residents – is due to change variation or real. The null hypothesis of interest, in this case, would be equality of enrollment yield means between residents and non-residents. In performing all these tests we assume that population variances for both groups are equal. The assumption of normality is not critical because of large sample size. Under these assumptions the following pooled t-test can be used:

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where:

S^2 = Variance
$\bar{x}_1$ = mean for group one
$\bar{x}_2$ = mean for group two
n_1 = number of observations for group one
n_2 = number of observations for group two
s_1^2 = Variance for group one
s_2^2 = Variance for group two

The pooled variance is computed using the following estimator:

$$S^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 + n_2 - 2)}$$

Table 4.4 presents t tests for differences in means in enrollment yields using the entire sample for 1999-2009 period. The sample average of 0.4934 for residents (see first line, table 4.4) means that during 1999-2009 period, 49.34 percent of admitted residents actually enrolled at the University of Arizona. The average enrollment yield for non-residents is 0.2740 resulting in a test statistic of 99.21. Thus the hypothesis of no difference in enrollment yield averages for residents and non- residents is clearly rejected. Thus other things being equal, an admitted

resident is almost twice as likely as non-resident to matriculate at the University of Arizona.

Likewise, the t-test analysis was computed for gender, ethnicity, standardized tests, academic index (AI), orientation, high school type, UA Honors, merit amount offered and the geographic region of residency. Female student is more likely to enroll than male admitted student although the difference in enrollment yield (39.87 percent female vs. 36.73 percent male) is not as great as that of residency. In the case of ethnicity, the t-test for African American is statistically insignificant. We fail to reject the null hypothesis, meaning that when comparing the African American mean to the non-African American mean there is not difference in enrollment rate. This preliminary result is important in terms of enrollment outcomes. More African-American outreach and enrollment increased from this ethnical segment would affect positively the total enrollment yield at the University of Arizona. On the other hand, Asian, Native American, Hispanic, and White are statistically significant. The null hypothesis is rejected. Thus, other things constant, Asian American are more likely to enroll when compare with non-Asian American, similarly Hispanic, Native American and White. However, for years 2007 to 2009, Native American is statistically insignificant. In this case we fail to reject the null hypothesis that there is not evidence that the Native American enrollment differs from Non-Native American enrollment. This preliminary result in the change of statistically significance for Native American in the 2007-2009 period is important to the University of Arizona in terms of enrollment outcome.

Students who reported standardized ACT test are more likely to enroll than students who did not report standardized ACT test. Similarly, reported SAT indicates a higher likelihood of enrollment than those not reporting SAT. Academic Index (AI) is statistically significant. We reject the null hypothesis. Students with calculated Academic Index are more likely to enroll

than students with not calculated AI.

Not surprising, students who participated in orientation are more likely to enroll than students who did not participate in orientation. The orientation variable is an indicator of highly commitment to enroll at the University of Arizona. From 2007-2009 94.84 percent of students who attend Orientation did enroll at the University of Arizona.

Contrary to what we should expect, 38.31 percent of admitted students from public schools enrolled at The University of Arizona while 39.89 percent of admitted students from all other type of schools enrolled at The University of Arizona resulting in a significant test statistic of -2.64. Thus, the hypothesis of no difference in enrollment yield average from public schools and non-public schools is rejected. Thus, an admitted student from non-public schools are more like to matriculate at the University of Arizona. Private high school is statistically insignificant. We fail to reject the null hypothesis. There is not statistical evidence that students from private schools enroll at a higher rate than students from non-private high schools. Similarly, home school is statistically insignificant. However, charter school is significant. Students from charter schools tend to enroll at a higher rate than students from non-charter schools.

UA Honors is statistically significant. Students admitted to the UA Honors colleges are more likely to enroll than students that were not admitted to the UA Honors College.

Merit amount offered is statistically significant. However, we observe that admitted students who were not offered merit funding tend to enroll at a higher rate than students who were offered merit amount. The interpretation of this result is clearly related to the observed trend on average enrollment outcomes at the University of Arizona by SAT scores from 1999-2009. On average, students with lower SAT scores enroll at a higher rate than student with higher SAT scores (see table 3.6). These students are less likely to receive merit amounts since

high SAT scores is one of the determinant factors to obtain any merit award. This finding would be interesting for further investigation if financial aid data including loans, grants and work-study would have been available.

USA geographic region is statistically significant for each region in this study. freshmen applicants NorthEast South, West, MidWest and other regions tend to enroll at a lower rate than students from Arizona. Similar results are obtained when the analysis is performed by Arizona residents and non-residents groups. These results are similar to findings in previous studies.

Dependent students are more likely to enroll than independent students. Similarly, students with expected family contribution (EFF) are more likely to enroll than students with non-EFC. This variable measures the capability of students to afford tuition and other college expenses.

In order to strengthen the previous t-test analysis results, individual t-test analyses are computed for two variables: Orientation and Residency on a yearly base for years 2007 to 2009 and 1999 to 2009 respectively (tables 4.6 and 4.7). As expected, on average students who attend orientation in each year are more likely to enroll than students who did not attend orientation. . Similarly, Arizona resident admitted students are more likely to enroll than non-resident admitted students in each year. These results were expected and are consistent to the previous analysis results.

Probit Analysis:

The preceding t tests, while informative, do not control for other variables when testing for differences in the means of groups. A regression analysis is used to simultaneously control for and account for the influence of various factors that influence one's enrollment decision. We used applicant level data for this analysis. The variable of interest is if an individual actually

enrolls at the University of Arizona or not.

Because of the dichotomous nature of the dependent variable (enroll/ did not enroll), a Logit or a Probit model could be used. In this study a Probit model is used for analyzing the influence of various factors on an individual matriculation decision. The development of the logit is identical to that of probit model. The latent variable interpretation of the logit proceeds exactly the same way as in the probit and the formulation of both models ensures that the predicted probabilities lie between 0 an 1. However in this case, the probit is preferred over the logit model due to the difference between the normal distribution and the logistic distribution, which has more weight in the tails. There are practical reasons for favoring one or the other in some cases for mathematical convenience, but it is difficult to justify the choice of one distribution or another in theoretical grounds (Greene, 2008). Assumption of normal distribution in this case is not critical due to the large sample size.

A Probit model is usually specified in terms of latent variables as follow:

$$y_i^* = \beta' x_i + \mu_i$$

$$y_i = \begin{cases} 1 \; if \; y_i^* > 0 \\ 0 \; if \; y_i^* \leq 0 \end{cases}$$

where:

β is a vector of parameters,

x is a vector of explanatory variables, and

y is the binary dependent variable.

Maximum likelihood methods are used for estimating model parameters. Two separates sets of estimation are done. The first set of estimates, presented in table 4.9, is for the sample

period 1999-2009.

To take advantage of additional set of variables available in more recent years, another set of probit models are estimated for 2007-2009. These later set of results are given in table 4.10. Five different models are estimated for both data sets.

In each case, Models 1 includes students' residency (e.g. non-resident to Arizona), personal characteristics (e.g. female, first generation, dependent), , school type (e.g. public high school, charter school), student performance (e.g. high school GPA), standardized test scores (e.g. SAT), and the University of Arizona characteristics (admitted to the Honors College, offered merit aid). University of Arizona Academic Index (AI) is excluded from these models because of its correlation with GPA and test scores (SAT, ACT). When AI is regressed by GPA and SAT, 95 percent of the model is explain by these two variables (R^2= 95%). Similarly the variable orientation is omitted in the 2007-2009 data set analyses because it is a indicator of 95 percent commitment to enroll at the University of Arizona.

In Model 2, variables related to ethnicity are added.

Model 3 includes all the variables from models 1 and 2 additionally to a dummy variable for each academic year and a variable for tuition and fees cost-index. Year 1999 is used as control variable for the 1999-2009 period and year 2007 for the 2007-2009 period. Tuition and fees for resident and non-resident students at the University of Arizona's along with the 22 colleges mentioned as peer institutions in the UA Fact Book were indexed for the 1999-2009 period (see table 4.9).

Model 4 is similar to model 2. However, State of residency is group into six geographic regions instead of previous two categories for resident and non-resident. The control variable is Arizona. And, model 5 adds dummies variables for academic years to model 4.

In the first three models, the variable residency reflects whether the student was Arizona resident or not. While in Models 4 and 5 residency was divided into geographic regions (e.g. MidWest, NorthWest, South, West, Other regions, and Arizona).

The idea behind the construction of these five models is to determine how the exogenous variables available may influence and contribute to individual enrollment decision. As a consequence, we could make inferences regarding the core questions stated in the objective of this study:

- What factors predict the likelihood of student's enrollment at the UA?
- Do ethnicity, gender, and academic ability affect college choice?
- Controlling for these factors, what role does distance between home and college play in college choice?

From table 4.9, the negative sign in the coefficient estimates for non-resident students indicates that holding everything else constant, non-resident admitted applicants are less likely to enroll at the University of Arizona than students from Arizona. This result is statistically significant in explaining the variation in the likelihood of college-enrollment choice at the University of Arizona and remains constant in the five models. This result is not surprising and is consistent with the literature and with preliminary analyses of the dataset.

Contrary to what we expect from the preliminary analyses, negative sign in the coefficient estimates for females indicates that females are less likely to enroll at the University of Arizona than males. This strong result holds constant in the five models and is statistically significant.

In models 2 though 5, among categorical variables in ethnicity the control variable used is White-admitted students. We observe that coefficient estimates for the Asian American are

statistically significant and positive. This indicates that holding everything else constant, Asian Americans are more likely to enroll at the University of Arizona relative to White admitted students. This finding is particularly important and could be used for marketing purpose in targeting this segment of ethnicity for recruitment purposes.

Surprisingly, coefficient estimates for Hispanic are negative in models 2, 3, and 4 and are statistically insignificant in explaining variations across college enrollment choice (enroll/non-enroll). In model 5, the sign of the coefficient estimate change to positive but is statistically insignificant at 95% of level of confidence.

The other two ethnicity variables (e.g. Native American, and other races) have negative coefficient estimates and are statistically significant at 95% level of confidence.

The coefficient estimate for first generation is negative and statistically significant at the 95% level of confidence. Students who are first generation to attend college in their family are less likely to enroll at the University of Arizona than students who are not first generation to attend college.

Consistent with preliminary analyses of the dataset, the positive sign in the coefficient estimates for the variable dependent indicates that controlling for everything else admitted-dependent students are more likely to enroll at the UA than students who do not depend economically from their parents.

As expected, in the five models the positive sign in the coefficient estimates for school type indicates that holding everything else constant, students from either public schools or charter schools are more likely to enroll at the University of Arizona relative to private schools.

Coefficient estimates for the variable UA Honors College are statistically significant at 95% level of confidence. However, the sign of the estimates changes across models. In models

1,2 and 3 the sign is negative. The sign changes to positive in modes 3 and 5 when tuition and fees index and dummies variables are incorporated. This is and indicator that tuition and fees and academic years are influential in students applying and being admitted to the UA Honors college.

As expected offering merit funding has a positive effect in the likelihood of college enrollment choice at the University of Arizona.

Not surprisingly, in the five models the negative sign in the coefficient estimates for student performance, standardized tests indicates that controlling for every thing else, admitted students with higher GPA or SAT are less likely to enroll at the University of Arizona.

In models 2 though 5, among ethnicity the control variable used is White-admitted students. We observe that coefficient estimates for the variable Asian American are statistically significant and positive. This indicates that holding everything else constant, Asian Americans are more likely to enroll at the University of Arizona relative to White admitted students. This finding is particularly important and could be targeted through marketing strategies for recruitment purposes.

In Models 4 and 5, to further analyze the effect of the residency variable in individual enrollment decision, states of residency are grouped into regions. We can observe that coefficient estimates for each region have negative sign. This indicate that holding everything else constant students from MidWest, NorthEast, South, Other region, and West are less likely to enroll at the University of Arizona than students from Arizona. This result is consistent with the results from models 1,2, and 3. Regardless of grouping non-resident students by geographic regions, the negative sign in the coefficient estimates remain the same. This is also consistent with previous literature.

From Table 4.10, models 1 through 5 correspond to the analysis of three academic years

from 2007 to 2009. In these models we observe some interesting variations on coefficient estimates. The coefficient estimates for the variables Asian American and first generation are statistically insignificant in explaining the likelihood of enrollment at the University of Arizona during these three years of analysis.

A strong result is observed for the variable UA Honors College through the 5 models. Coefficients estimates for the UA Honors College have a positive effect in explaining the likelihood of college enrollment choice at the University of Arizona. The positive sign in the coefficient estimates indicates that students who are admitted to the UA Honors College are more likely to enroll at the University of Arizona than those who are not admitted to the UA Honors College.

The additional variables incorporated in these models for students who apply online and the expected family contribution (used as a proxy for ability to pay) are statistically significant in explaining the likelihood of college enrollment choice at the University of Arizona. However, online application has an negative effect while the expected family contribution has a positive effect. Students whose parents are able to pay for student's education are more likely to enroll at the university of Arizona.

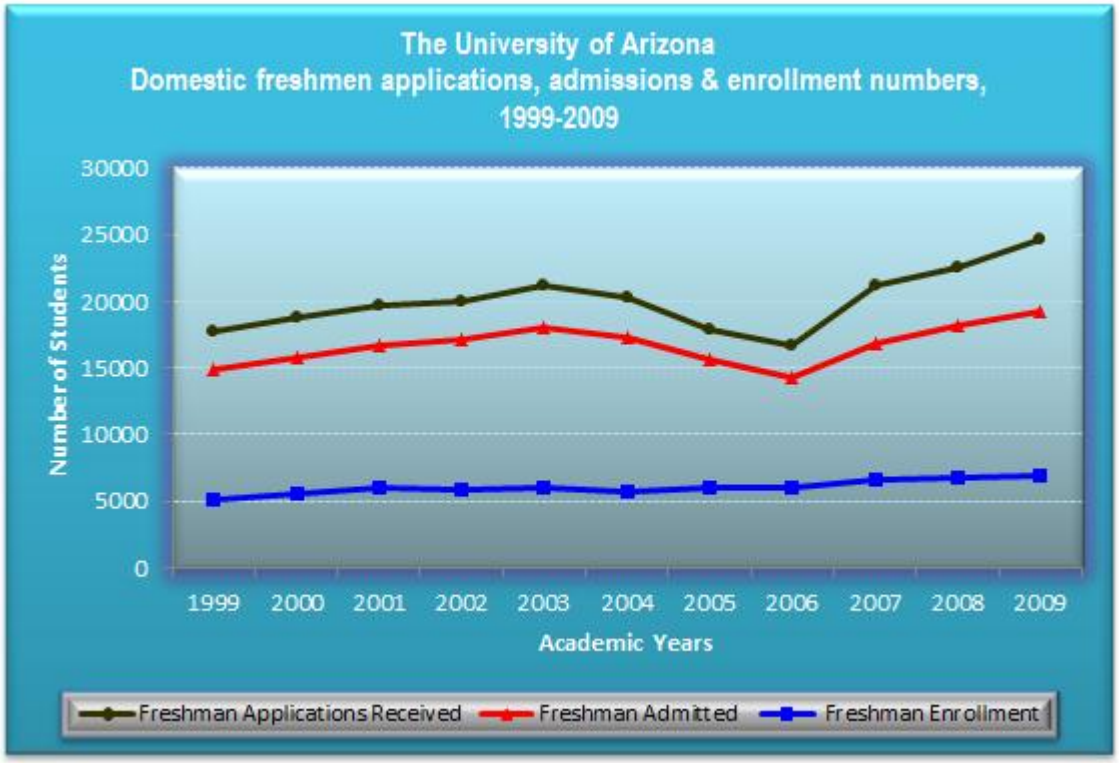
To conclude this analysis, in tables 4.11 and tables 4.12 the marginal effect is computed on the predictors for each model. In model 1, the marginal effect of residency on the likelihood of enrollment at the University of Arizona is decreased approximately 22 percent when the admitted applicant is non-resident. Similar interpretation is applicable for the marginal effect of High School GPA. The marginal effect of HS GPA on the likelihood of enrollment at the University of Arizona is decreased approximately 10 percent for a unit of increase in HS GPA. An average HS GPA of 3.0 was used for marginal effect calculations.

Table 4. 1 Domestic freshman applications, admissions, and enrollment at the University of Arizona, 1999-2009

Academic Year	Freshman Applications Received	Freshman Admitted (Headcount)	Enrollment (Headcount)	Admissions Yield	Enrollment Yield
1999	17700	14868	5098	84%	34%
2000	18729	15816	5526	84%	35%
2001	19735	16621	5949	84%	36%
2002	19982	17075	5808	85%	34%
2003	21185	18021	5958	85%	33%
2004	20316	17304	5725	85%	33%
2005	17903	15700	5974	88%	38%
2006	16609	14293	6009	86%	42%
2007	21199	16853	6569	79%	39%
2008	22544	18158	6709	81%	37%
2009	24625	19207	6966	78%	36%
1999-2009 total	220527	183916	66291		
1999-2009 average	20048	16720	6026	84%	36%

SOURCE: The University of Arizona Fact Book (http://factbook.arizona.edu/).
Admissions and enrollment yields are computed for descriptive statistics purposes.

Graph 4. 1 Domestic freshman applications, admissions, and enrollment at the University of Arizona, 1999-2009



Graph 4. 2 Domestic freshman admissions and enrollment yields at the University of Arizona, 1999-2009

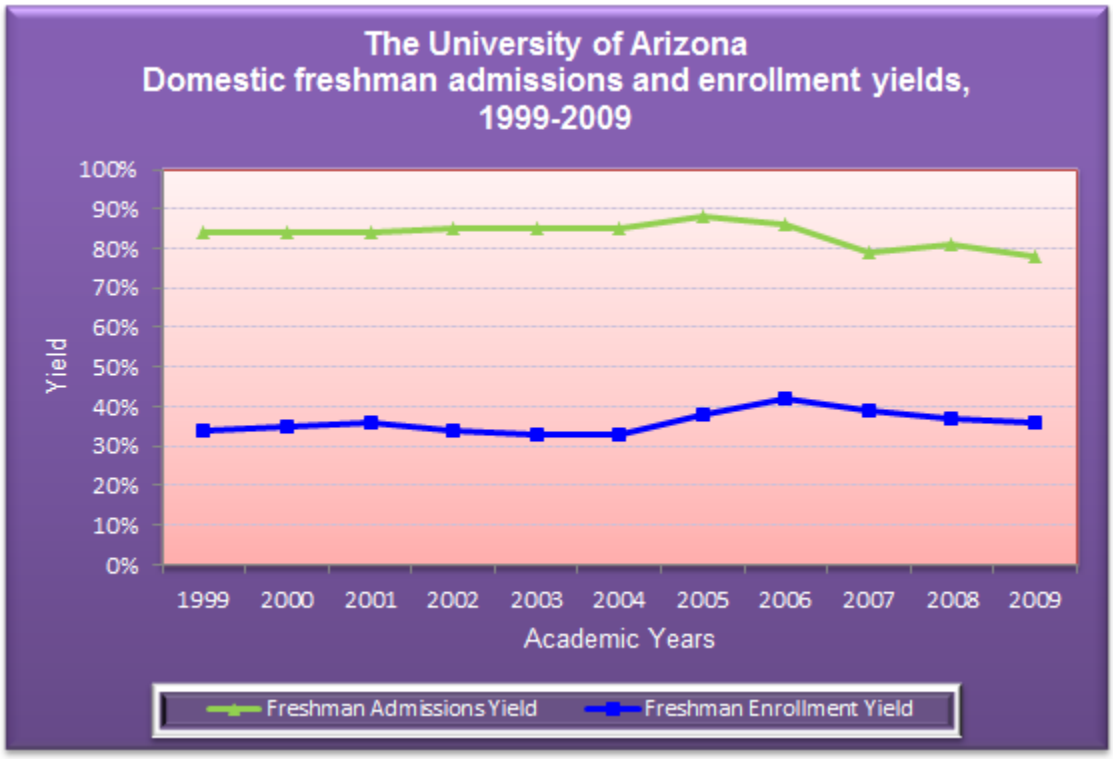


Table 4. 2 Domestic freshman applications, admissions and enrollment at Washington State University (WASU), Arizona State University (ASU), and the University of Arizona (UA), 1999-2009

	WASU			ASU			UA		
Academic Year	Freshman Applications Received	Freshman Admitted Total	Matriculation	Freshman Applications Received	Freshman Admitted Total	Matriculation	Freshman Applications Received	Freshman Admitted Total	Matriculation
1999	7133	6009	2788	N/A	N/A	N/A	17700	14868	5098
2000	7524	6310	2802	N/A	N/A	N/A	18729	15816	5526
2001	7968	6484	2917	21821	16360	6586	19735	16621	5949
2002	8989	6904	3149	23080	16276	6820	19982	17075	5808
2003	9182	7206	3391	24502	18490	7647	21185	18021	5958
2004	9508	7148	3316	26194	19132	7719	20316	17304	5725
2005	9193	6793	3126	24727	19791	8467	17903	15700	5974
2006	9314	7177	3046	27877	22226	9052	16609	14293	6009
2007	10853	8240	3730	28644	23504	9274	21199	16853	6569
2008	11983	8677	4272	30809	24473	9707	22544	18158	6709
2009	12478	9489	4183	28394	25616	9344	24625	19207	6966
1999-2009 Total	104125	80437	36720	236048	185868	74616	220527	183916	66291
1999-2009 Average	9466	7312	3338	26228	20652	8291	20048	16720	6026

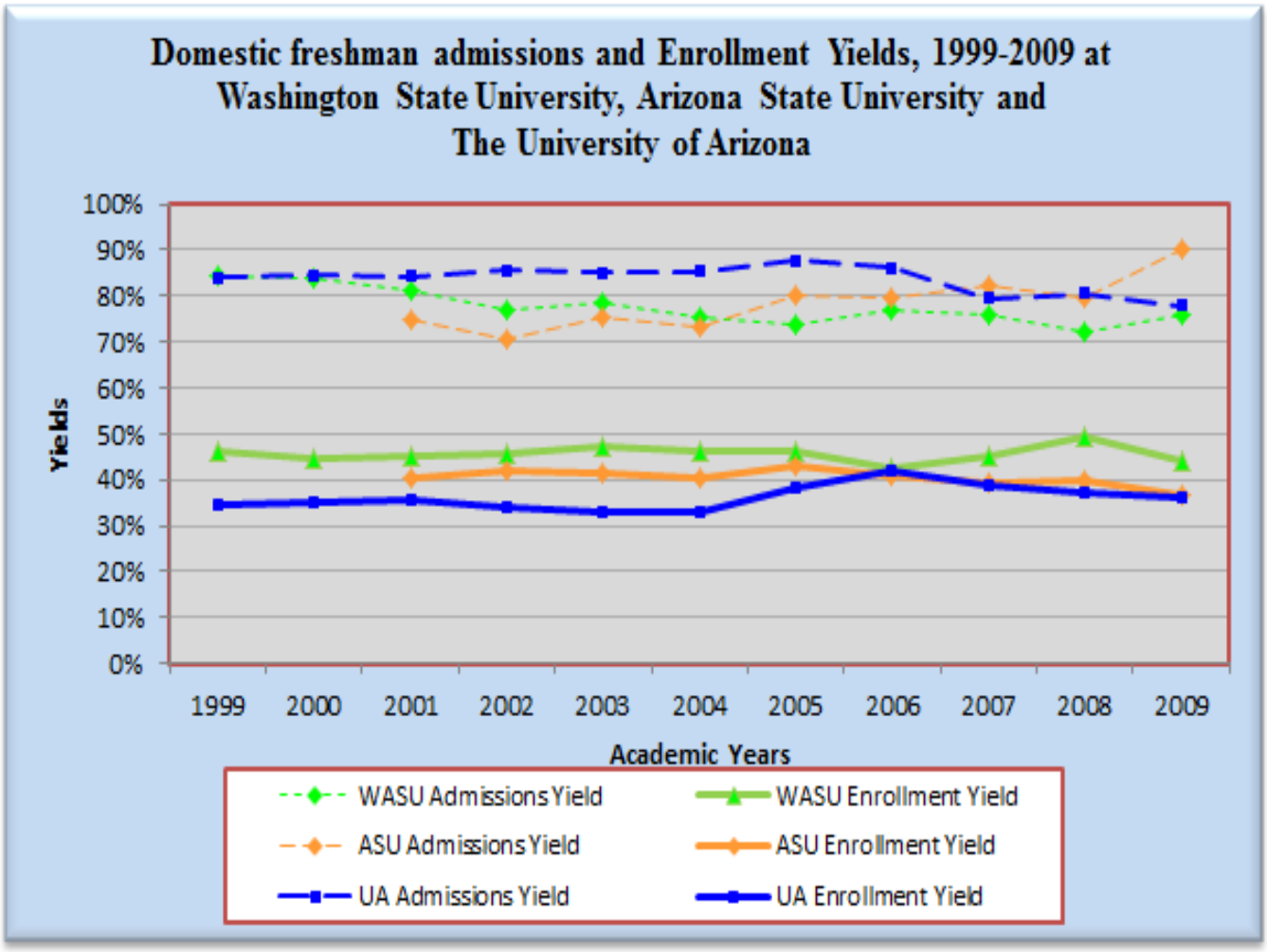
Source: 1) Data obtained from the Washington State University (WASU) Fact Book (http://ir.wsu.edu/Student%20Data)
2) Data obtained from the Arizona State University (ASU) Fact Book (http://uoia.asu.edu/fact-book)
3) Data obtained from The University of Arizona Fact Book (http://factbook.arizona.edu/)

Table 4. 3 Domestic freshman applications, admissions and enrollment yields at Washington State University (WASU), Arizona State University (ASU), and the University of Arizona (UA), 1999-2009

	WASU		ASU		UA	
Academic Year	Admissions Yield	Enrollment Yield	Admissions Yield	Enrollment Yield	Admissions Yield	Enrollment Yield
1999	84%	46%	N/A	N/A	84%	34%
2000	84%	44%	N/A	N/A	84%	35%
2001	81%	45%	75%	40%	84%	36%
2002	77%	46%	71%	42%	85%	34%
2003	78%	47%	75%	41%	85%	33%
2004	75%	46%	73%	40%	85%	33%
2005	74%	46%	80%	43%	88%	38%
2006	77%	42%	80%	41%	86%	42%
2007	76%	45%	82%	39%	79%	39%
2008	72%	49%	79%	40%	81%	37%
2009	76%	44%	90%	36%	78%	36%
1999-2009 Average	78%	46%	78%	40%	84%	36%

Source: Admissions and enrollment yields computed from data in table 4.2

Graph 4. 3 Domestic freshman admissions and enrollment at Washington State University (WASU), Arizona State University (ASU), and the University of Arizona (UA), 1999-2009



Graph 4. 4 Domestic freshman application, admissions, and matriculation at The University of Arizona (UA), Arizona State University (ASU), and Washington State University (WASU), 1999-2009

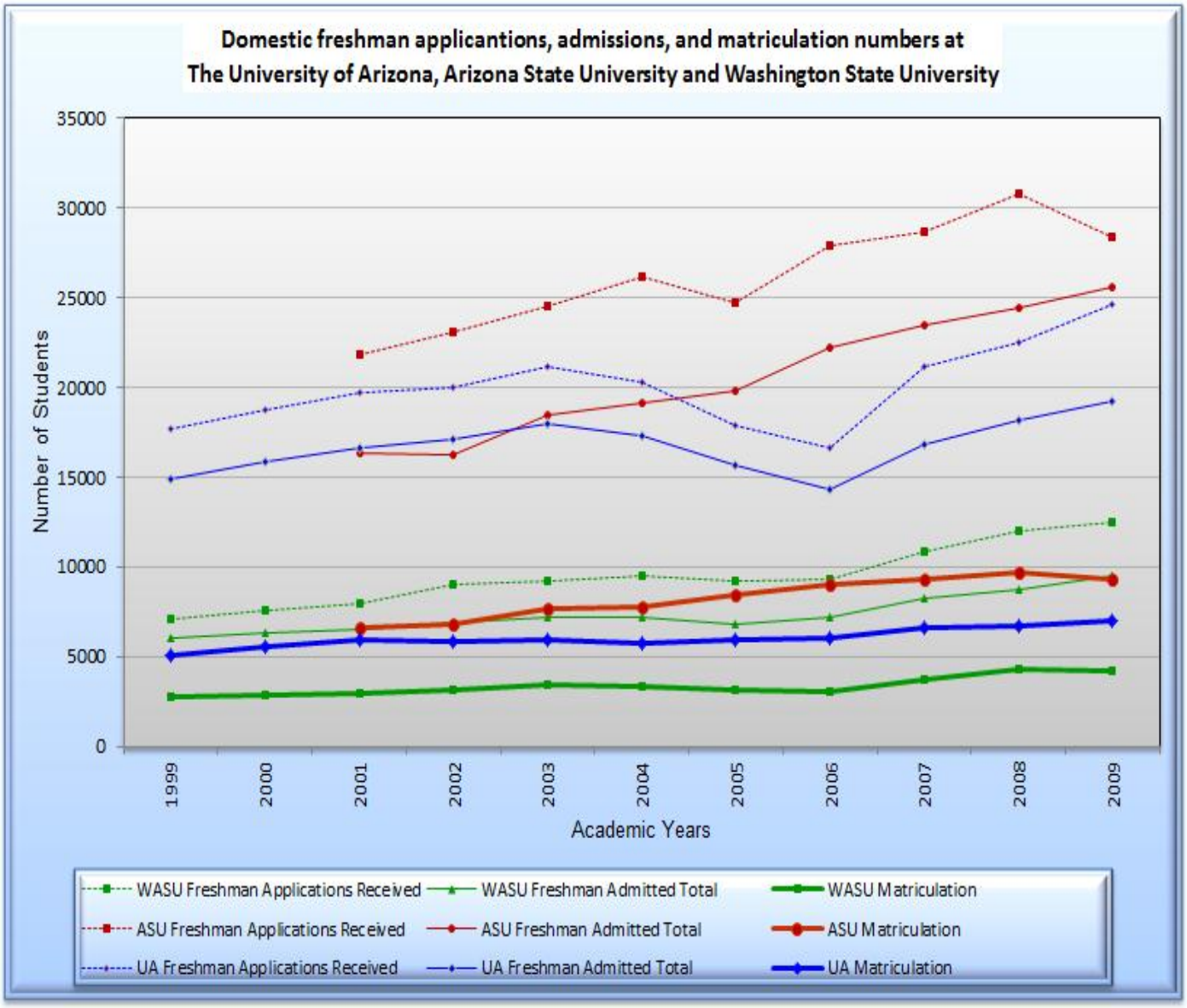


Table 4. 4 Testing for differences in average enrollment yields, 1999-2009

Group	Variables	Frequency (Admitted)	Mean (Yield)	Std Dev	t-value
Residency	Resident	91832	0.4934	0.5000	99.21*
	Non-resident	91795	0.2740	0.4460	
Gender	Female	96080	0.3987	0.4896	13.81*
	Male	87547	0.3673	0.4821	
Ethnicity	African American	6317	0.3954	0.4890	1.95
	Non-African American	177310	0.3833	0.4862	
	Asian	11030	0.4330	0.4955	10.98*
	Non-Asian	172597	0.3806	0.4855	
	Hispanic	23566	0.4704	0.4991	29.38*
	Non-Hispanic	160061	0.3710	0.4831	
	Native American	4235	0.4130	0.4924	3.96*
	Non-Native American	179392	0.3830	0.4861	
	Otherace	14878	0.1501	0.3572	-61.76*
	Non-Otherace	168749	0.4043	0.4908	
	White	123601	0.3893	0.4876	7.08*
	Non-White	60026	0.3722	0.4834	
Socio-economic background	First Generation	5147	0.4671	0.4990	12.48*
	Non-First Generation	178480	0.3813	0.4857	
	Dependent	31180	0.5668	0.4955	74.03*
	Non dependent	152447	0.3463	0.4758	
Standarized Test	Reported ACT	72980	0.4145	0.4926	22.05*
	Did not Report ACT	110647	0.3634	0.4810	
	Reported SAT	127184	0.4512	0.4976	*91.27
	Did Not Report SAT	56443	0.2317	0.4219	
Academic Index	Calculated AI	172265	0.3960	0.4891	*42.39
	Did not calculate AI	11362	0.1973	0.3980	
High School Type	Private High School	5445	0.3816	0.4858	-0.32
	Non Private High School	178182	0.3838	0.4863	
	Public High School	176738	0.3831	0.4862	-2.64*
	Non Public High School	6889	0.3989	0.4897	
	Charter High School	1444	0.4640	0.4989	6.30*
	Non Charter High School	182183	0.3831	0.4861	
	Home School	170	0.4235	0.4956	1.07
	Non Home School	183457	0.3837	0.4863	
UA Honors	Admitted to the UA Honors College	6920	0.4577	0.4982	12.90*
	Did not admit to the UA Honors College	176707	0.3808	0.4856	
Merit Amount	Merit Amount Offered	159981	0.3754	0.4842	-19.16*
	Merit Amount was not offered	23646	0.4402	0.4964	
USA Geographic Region	MidWest	15702	0.2846	0.4512	-26.76*
	Non MidWest region	167925	0.3930	0.4884	
	NorthEast region	11603	0.2976	0.4572	-19.73*
	Non NorthEast region	172024	0.3895	0.4876	
	South	11925	0.2614	0.4394	-28.47*
	Non South region	171702	0.3922	0.4882	
	Other Regions	2420	0.2674	0.4427	-11.86*
	Non Other Regions	181207	0.3853	0.4867	
	West region	51043	0.2876	0.4527	-52.95*
	Non West region	132584	0.4207	0.4937	
	Arizona	90934	0.4849	0.4998	90.26*
	Non Arizona	92693	0.2845	0.4512	

* Statistically significant at 95% confidence level

Table 4. 5 Testing for differences in average enrollment yields, 2007-2009

Group	Variables	Frequency	Yield (Mean)	Std Err	t-value
Residency	Resident	27038	0.5756	0.0016	67.96*
	Non-resident	30307	0.3046	0.0015	
Gender	Female	31321	0.4365	0.0016	2.16*
	Male	26024	0.4275	0.0016	
Ethnicity	African American	2467	0.4443	0.0062	1.22
	Non-African American	54878	0.4319	0.0012	
	Asian	3984	0.4669	0.0047	4.55*
	Non-Asian	53361	0.4298	0.0012	
	Hispanic	8922	0.5234	0.0033	18.95*
	Non-Hispanic	48423	0.4156	0.0012	
	Native American	1678	0.4672	0.0076	2.92*
	Non-Native American	55667	0.4314	0.0011	
	Otherace	1216	0.3224	0.0029	-7.83*
	Non Otherace	56129	0.4348	0.0012	
	White	39078	0.4093	0.0014	-16.38*
	Non-White	18267	0.4819	0.0020	
Socio-economic background	First Generation	2040	0.5299	0.0070	9.06*
	Non-First Generation	55305	0.4288	0.0011	
	Dependent	31180	0.5668	0.0028	74.23*
	Non Dependent	26165	0.2723	0.0012	
Standarized Test	Reported ACT	26175	0.4071	0.0018	-11.22*
	Did not Report ACT	31170	0.4536	0.0014	
	Reported SAT	43226	0.4556	0.0014	19.71*
	Did Not Report SAT	14119	0.3613	0.0018	
Academic Index	Calculated AI	53798	0.4405	0.0012	15.31*
	Did not calculate AI	3547	0.3093	0.0037	
High School Type	Private High School	1742	0.4127	0.0066	-1.68
	Non Private High School	55603	0.4330	0.0012	
	Public High School	55013	0.4319	0.0012	1.18
	Non Public High School	2332	0.4443	0.0059	
	Charter High School	590	0.5373	0.0131	5.17*
	Non Charter High School	56755	0.4313	0.0011	
	Home School	86	0.4419	0.0380	0.18
	Non Home School	57259	0.4324	0.0011	
UA Honors	Admitted to the UA Honors College	6920	0.4577	0.0060	4.52*
	Did not admit to the UA Honors College	50425	0.4289	0.0012	
Merit Amount Offered	Merit Amount offered	33699	0.4269	0.0012	-3.18*
	Did not offer Merit Amount	23646	0.4402	0.0032	
USA Geographic Region	MidWest	4755	0.3136	0.0036	-17.32*
	Non MidWest region	52590	0.4431	0.0012	
	NorthEast region	4478	0.3153	0.0042	-16.51*
	Non NorthEast region	52867	0.4423	0.0012	
	South	3812	0.2802	0.0040	-19.70*
	Non South region	53533	0.4432	0.0012	
	Other Regions	677	0.3442	0.0090	-4.66*
	Non Other Regions	56668	0.4335	0.0011	
	West region	16557	0.3236	0.0020	-33.84*
	Non West region	40788	0.4766	0.0014	
	Arizona	27066	0.5628	0.0017	61.55*
	Non Arizona	30279	0.3158	0.0015	
Orientation	Participated in Orientation	26073	0.9484	0.0011	736.57*
	Did notparticipate in Orientation	31272	0.0022	0.0011	
Online Application	Online Application	54270	0.4264	0.0019	-12.19*
	Non Online Application	3075	0.5382	0.0014	
Sum of Effective Contrlbution (EFC)	Sum of EFC	25112	0.5556	0.0019	53.89*
	Non Sum of EFC	32233	0.3364	0.0014	

* Statistically significant at 95% confidence level

Table 4. 6 Testing for average enrollment yields by individual academic years, 2007- 2009. Orientation Variable

Year	Group	Variables	Admittted (Count)	Yield (Mean)	Std Err	t-value
2007	Orientation	Participated in Orientation	9209	0.9471	0.0003	397.50*
		Did not participate in Orientation	9522	0.0035	0.0028	
2008	Orientation	Participated in Orientation	10564	0.9553	0.0004	462.49*
		Did not participate in Orientation	9684	0.0020	0.0021	
2009	Orientation	Participated in Orientation	7180	0.9407	0.0006	412.86*
		Did not participate in Orientation	11186	0.0013	0.0023	

* Statistically significant at 95% confidence level

Table 4. 7 Testing for average enrollment yields by individual academic years, 1999-2009. Residency Variable

Year	Group	Variables	Admittted (Count)	Yield (Mean)	Std Err	t-value
1999	Residency	Resident	7283	0.4445	0.0058	21.70*
		Non-resident	7207	0.2742	0.0053	
2000	Residency	Resident	7678	0.4439	0.0057	26.22*
		Non-resident	7640	0.2467	0.0049	
2001	Residency	Resident	7994	0.4621	0.0056	26.98*
		Non-resident	8103	0.2622	0.0049	
2002	Residency	Resident	8624	0.4390	0.0053	27.36*
		Non-resident	7989	0.2416	0.0048	
2003	Residency	Resident	9536	0.4462	0.0051	31.18
		Non-resident	8173	0.2286	0.0046	
2004	Residency	Resident	9136	0.4145	0.0052	24.46*
		Non-resident	7575	0.2383	0.0049	
2005	Residency	Resident	7724	0.4939	0.0057	29.22*
		Non-resident	7539	0.2701	0.0051	
2006	Residency	Resident	6819	0.5520	0.0060	29.08*
		Non-resident	7262	0.3162	0.0055	
2007	Residency	Resident	8807	0.6022	0.0052	36.03
		Non-resident	9924	0.3477	0.0048	
2008	Residency	Resident	9648	0.6180	0.0049	45.81*
		Non-resident	10600	0.3123	0.0045	
2009	Residency	Resident	8583	0.5006	0.0054	35.95*
		Non-resident	9783	0.2527	0.0044	

* Statistically significant at 95% confidence level

Table 4. 8 The University of Arizona Peer Institutions

Institution Name
Arizona State University
Michigan State University
Ohio State University-Main Campus
Oregon State University
Pennsylvania State University-Main Campus
Stanford University
Texas A & M University
The University of Texas at Austin
University of Arizona
University of California-Berkeley
University of California-Davis
University of California-Los Angeles
University of Florida
University of Illinois at Urbana-Champaign
University of Iowa
University of Maryland-College Park
University of Minnesota-Twin Cities
University of North Carolina at Chapel Hill
University of Oregon
University of Southern California
University of Washington-Seattle Campus
University of Wisconsin-Madison
Washington State University

Source: The University of Arizona Fact Book (http://factbook.arizona.edu/)

Table 4. 9 Maximum likelihood estimates of Probit models, 1999-2009

MODEL 1 Analysis of Maximum Likelihood Parameter Estimates			MODEL 2		MODEL 3		MODEL 4		MODEL 5	
Parameter	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**
Intercept	0.8775	0.0362*	0.9460	0.0371*	3.9475	0.0924*	0.8871	0.0370*	3.8192	0.0870*
Nonresident	-0.7008	0.0071*	-0.7029	0.0072*	-0.4730	0.0811*				
Female	-0.0378	0.0069*	-0.0381	0.0069*	-0.0398	0.0072*	-0.0388	0.0069*	-0.0405	0.0072*
Africam			-0.1414	0.0184*	-0.1406	0.0190*	-0.1338	0.0183*	-0.1330	0.0190*
Asianam			0.0338	0.0136*	0.0406	0.0142*	0.0357	0.0137*	0.0453	0.0142*
Hispanic			-0.0179	0.0103	-0.0058	0.0106	-0.0078	0.0103	0.0031	0.0106
Nativeam			-0.1607	0.0223*	-0.1788	0.0232*	-0.1196	0.0222*	-0.1425	0.0230*
Otherace			-0.1018	0.0175*	-0.0230	0.0179	-0.1033	0.0174*	-0.0254	0.0178
FirstGen	-0.0522	0.0193*	-0.0467	0.0193*	-0.0595	0.0202*	-0.0523	0.0192*	-0.0624	0.0201*
Depend	0.5150	0.0094*	0.5197	0.0094*	0.7098	0.0117*	0.5146	0.0094*	0.7185	0.0116*
GPA	-0.2650	0.0087*	-0.2692	0.0087*	-0.2367	0.0092*	-0.2511	0.0088*	-0.2158	0.0092*
SAT	-0.0004	0.0000*	-0.0005	0.0000*	-0.0004	0.0000*	-0.0005	0.0000*	-0.0004	0.0000*
PublicHS	0.3310	0.0191*	0.3296	0.0191*	0.3113	0.0198*	0.3180	0.0191*	0.2992	0.0198*
CharterHS	0.2036	0.0410*	0.2180	0.0411*	0.2546	0.0419*	0.2167	0.0409*	0.2539	0.0418*
UAHonors	-0.0504	0.0177*	-0.0502	0.0177*	0.0854	0.0186*	-0.0474	0.0176*	0.0987	0.0185*
MeritAmt	0.3170	0.0111*	0.3200	0.0111*	0.1324	0.0130*	0.3134	0.0111*	0.1108	0.0129*
MidWest							-0.6039	0.0127*	-0.5849	0.0133*
NorthEast							-0.6448	0.0145*	-0.6033	0.0151*
South							-0.7102	0.0144*	-0.6777	0.0150*
Otheregion							-0.6312	0.0083*	-0.6001	0.0087*
West							-0.6387	0.0309*	-0.6670	0.0325*
UATuitionIndx					-0.3868	0.1557*				
Year2000					-1.1089	0.0825*			-1.1003	0.0828*
Year2001					-2.9632	0.0782*			-2.9599	0.0785*
Year2002					-3.0685	0.0783*			-3.0577	0.0785*
Year2003					-3.0521	0.0781*			-3.0529	0.0785*
Year2004					-3.1079	0.0781*			-3.1039	0.0785*
Year2005					-2.9530	0.0782*			-2.9534	0.0786*
Year2006					-2.8176	0.0782*			-2.8288	0.0786*
Year2007					-3.0422	0.0785*			-3.072	0.0789*
Year2008					-3.0911	0.0788*			-3.1357	0.0788*
Year2009					-3.2930	0.0805*			-3.3575	0.0790*
Number of Observations Used		154,819		154,819		154,819		154,819		154,819

* Statistically significant at 95% confidence level

Table 4. 10 Maximum likelihood estimates of Probit models, 2007-2009

MODEL 1 Analysis of Maximum Likelihood Parameter Estimates			MODEL 2		MODEL 3		MODEL4		MODEL 5	
Parameter	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**	**Estimate**	**Standard Error**
Intercept	2.3259	0.0847*	2.5327	0.0872*	2.6756	0.0879*	2.3401	0.0865*	2.4791	0.0872*
Nonresident	-0.8338	0.0136*	-0.8435	0.0138*	-0.8478	0.0138*				
Female	-0.0479	0.0121*	-0.0500	0.0121*	-0.0489	0.0121*	-0.0498	0.012*	-0.0489	0.0121*
Africam			-0.2664	0.0298*	-0.2567	0.0299*	-0.2583	0.0297*	-0.2490	0.0298*
Asianam			-0.0107	0.0228	0.0078	0.0229	-0.0136	0.0229	0.0052	0.0230
Hispanic			-0.0860	0.0171*	-0.0643	0.0172*	-0.0831	0.0172*	-0.0615	0.0172*
Nativeam			-0.1989	0.0357*	-0.1894	0.0358*	-0.1785	0.0354*	-0.1695	0.0356*
Otherace			-0.2044	0.0418*	-0.2416	0.0420*	-0.2075	0.0415*	-0.2439	0.0417*
FirstGen	0.0068	0.0320	0.0209	0.0322	-0.1145	0.0333*	0.0157	0.0319	-0.1174	0.0331*
Depend	0.5444	0.0180*	0.5712	0.0182*	0.5475	0.0184*	0.5828	0.0181*	0.5600	0.0183*
GPA	-0.4882	0.0201*	-0.5055	0.0202*	-0.5166	0.0203*	-0.4617	0.0202*	-0.4721	0.0202*
SAT	-0.0011	0.0000*	-0.0012	0.0000*	-0.0012	0.0000*	-0.0012	0.0000*	-0.0012	0.0000*
PublicHS	0.3819	0.0333*	0.3805	0.0333*	0.3848	0.0334*	0.3697	0.0333*	0.3731	0.0334*
CharterHS	0.3053	0.0653*	0.3120	0.0654*	0.3248	0.0656*	0.3083	0.0649*	0.3213	0.0652*
UAHonors	0.3035	0.0215*	0.3207	0.0216*	0.3499	0.0218*	0.3157	0.0215*	0.3444	0.0217*
MeritAmt	0.3481	0.0165*	0.3580	0.0165*	0.3535	0.0165*	0.3215	0.0164*	0.3173	0.0164*
MidWest							-0.7274	0.0229*	-0.7262	0.0230*
NorthEast							-0.7997	0.0240*	-0.8010	0.0242*
South							-0.8369	0.0254*	-0.8401	0.0255*
Otheregion							-0.7559	0.0154*	-0.7595	0.0155*
West							-0.7310	0.0540*	-0.7377	0.0541*
Year2008					-0.0977	0.0146*			-0.0978	0.0146*
Year2009					-0.3233	0.0151*			-0.3175	0.0150*
OnLineAppl	-0.1928	0.0263*	-0.2181	0.0265*	-0.1646	0.0267*	-0.2119	0.0263*	-0.1591	0.0265*
EFC	0.1839	0.0177*	0.1712	0.0178*	0.2157	0.0181*	0.1678	0.0177*	0.2114	0.0180*
Number of Observations Used	53,923		53,923		53,923		53,923		53,923	

* Statistically significant at 95% confidence level

Table 4. 11 Marginal Effect for maximum likelihood estimates of Probit models, 1999-2009

	MODEL 1 Analysis of Maximum Likelihood Parameter Estimates			MODEL 2			MODEL 3			MODEL 4			MODEL 5		
Parameter	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect
Intercept	0.8775	0.0362*		0.9460	0.0371*		3.9475	0.0924*		0.8871	0.0370*		3.8192	0.0870*	
Nonresident	-0.7008	0.0071*	-0.1908	-0.7029	0.0072*	-0.1761	-0.4730	0.0811*	-0.0110						
Female	-0.0378	0.0069*	-0.0131	-0.0381	0.0069*	-0.0125	-0.0398	0.0072*	-0.0005	-0.0388	0.0069*	-0.0126	-0.0405	0.0072*	-0.0006
Africam				-0.1414	0.0184*	-0.0447	-0.1406	0.0190*	-0.0021	-0.1338	0.0183*	-0.0423	-0.1330	0.0190*	-0.0023
Asianam				0.0338	0.0136*	0.0113	0.0406	0.0142*	0.0005	0.0357	0.0137*	0.0119	0.0453	0.0142*	0.0006
Hispanic				-0.0179	0.0103	-0.0059	-0.0058	0.0106	-0.0001	-0.0078	0.0103	-0.0026	0.0031	0.0106	0.0000
Nativeam				-0.1607	0.0223*	-0.0504	-0.1788	0.0232*	-0.0028	-0.1196	0.0222*	-0.0380	-0.1425	0.0230*	-0.0025
Otherace				-0.1018	0.0175*	-0.0326	-0.0230	0.0179	-0.0003	-0.1033	0.0174*	-0.0330	-0.0254	0.0178	-0.0004
FirstGen	-0.0522	0.0193*	-0.0180	-0.0467	0.0193*	-0.0152	-0.0595	0.0202*	-0.0008	-0.0523	0.0192*	-0.0170	-0.0624	0.0201*	-0.0010
Depend	0.5150	0.0094*	0.1966	0.5197	0.0094*	0.1930	0.7098	0.0117*	0.0038	0.5146	0.0094*	0.1907	0.7185	0.0116*	0.0046
GPA	-0.2650	0.0087*	-0.0925	-0.2692	0.0087*	-0.0891	-0.2367	0.0092*	-0.0029	-0.2511	0.0088*	-0.0829	-0.2158	0.0092*	-0.0032
SAT	-0.0004	0.0000*	-0.0001	-0.0005	0.0000*	-0.0002	-0.0004	0.0000*	0.0000	-0.0005	0.0000*	-0.0002	-0.0004	0.0000*	0.0000
PublicHS	0.3310	0.0191*	0.1236	0.3296	0.0191*	0.1186	0.3113	0.0198*	0.0026	0.3180	0.0191*	0.1139	0.2992	0.0198*	0.0030
CharterHS	0.2036	0.0410*	0.0744	0.2180	0.0411*	0.0765	0.2546	0.0419*	0.0023	0.2167	0.0409*	0.0759	0.2539	0.0418*	0.0027
UAHonors	-0.0504	0.0177*	-0.0174	-0.0502	0.0177*	-0.0164	0.0854	0.0186*	0.0009	-0.0474	0.0176*	-0.0154	0.0987	0.0185*	0.0013
MeritAmt	0.3170	0.0111*	0.1181	0.3200	0.0111*	0.1149	0.1324	0.0130*	0.0014	0.3134	0.0111*	0.1121	0.1108	0.0129*	0.0014
MidWest										-0.6039	0.0127*	-0.1577	-0.5849	0.0133*	-0.0184
NorthEast										-0.6448	0.0145*	-0.1652	-0.6033	0.0151*	-0.0194
South										-0.7102	0.0144*	-0.1765	-0.6777	0.0150*	-0.0240
Otheregion										-0.6312	0.0083*	-0.1628	-0.6001	0.0087*	-0.0193
West										-0.6387	0.0309*	-0.1641	-0.667	0.0325*	-0.0233
UATuitionIndx							-0.3868	0.1557*	-0.0080						
Year2000							-1.1089	0.0825*	-0.0590				-1.1003	0.0828*	-0.0655
Year2001							-2.9632	0.0782*	-0.6235				-2.9599	0.0785*	-0.6460
Year2002							-3.0685	0.0783*	-0.6626				-3.0577	0.0785*	-0.6814
Year2003							-3.0521	0.0781*	-0.6566				-3.0529	0.0785*	-0.6797
Year2004							-3.1079	0.0781*	-0.6768				-3.1039	0.0785*	-0.6976
Year2005							-2.9530	0.0782*	-0.6197				-2.9534	0.0786*	-0.6436
Year2006							-2.8176	0.0782*	-0.5673				-2.8288	0.0786*	-0.5964
Year2007							-3.0422	0.0785*	-0.6530				-3.0720	0.0789*	-0.6865
Year2008							-3.0911	0.0788*	-0.6708				-3.1357	0.0788*	-0.7085
Year2009							-3.2930	0.0805*	-0.7398				-3.3575	0.0790*	-0.7789
Number of Observations Used		154,819			154,819			154,819			154,819			154,819	

* Statistically significant at 95% confidence level

Table 4. 12 Marginal Effect for maximum likelihood estimates of Probit models, 2007-2009

	MODEL 1			MODEL 2			MODEL 3			MODEL4			MODEL 5		
Analysis of Maximum Likelihood Parameter Estimates															
Parameter	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect	Estimate	Standard Error	Marginal Effect
Intercept	2.3259	0.0847*		2.5327	0.0872*		2.6756	0.0879*		2.3401	0.0865*		2.4791	0.0872*	
Nonresident	-0.8338	0.0136*	-0.1628	-0.8435	0.0138*	-0.1647	-0.8478	0.0138*	-0.1861						
Female	-0.0479	0.0121*	-0.0137	-0.0500	0.0121*	-0.0144	-0.0489	0.0121*	-0.0153	-0.0498	0.012*	-0.0136	-0.0489	0.0121*	-0.0146
Africam				-0.2664	0.0298*	-0.0698	-0.2567	0.0299*	-0.0741	-0.2583	0.0297*	-0.0641	-0.2490	0.0298*	-0.0685
Asianam				-0.0107	0.0228	-0.0031	0.0078	0.0229	0.0025	-0.0136	0.0229	-0.0038	0.0052	0.0230	0.0016
Hispanic				-0.0860	0.0171*	-0.0244	-0.0643	0.0172*	-0.0200	-0.0831	0.0172*	-0.0224	-0.0615	0.0172*	-0.0183
Nativeam				-0.1989	0.0357*	-0.0537	-0.1894	0.0358*	-0.0562	-0.1785	0.0354*	-0.0460	-0.1695	0.0356*	-0.0482
Otherace				-0.2044	0.0418*	-0.0551	-0.2416	0.0420*	-0.0702	-0.2075	0.0415*	-0.0528	-0.2439	0.0417*	-0.0672
FirstGen	0.0068	0.0320	0.0020	0.0209	0.0322	0.0062	-0.1145	0.0333*	-0.0349	0.0157	0.0319	0.0044	-0.1174	0.0331*	-0.0341
Depend	0.5444	0.0180*	0.1884	0.5712	0.0182*	0.1992	0.5475	0.0184*	0.1995	0.5828	0.0181*	0.1975	0.5600	0.0183*	0.1992
GPA	-0.4882	0.0201*	-0.1427	-0.5055	0.0202*	-0.1483	-0.5166	0.0203*	-0.1642	-0.4617	0.0202*	-0.1289	-0.4721	0.0202*	-0.1435
SAT	-0.0011	0.0000*	-0.0003	-0.0012	0.0000*	-0.0004	-0.0012	0.0000*	-0.0004	-0.0012	0.0000*	-0.0003	-0.0012	0.0000*	-0.0004
PublicHS	0.3819	0.0333*	0.1269	0.3805	0.0333*	0.1268	0.3848	0.0334*	0.1360	0.3697	0.0333*	0.1182	0.3731	0.0334*	0.1274
CharterHS	0.3053	0.0653*	0.0993	0.3120	0.0654*	0.1020	0.3248	0.0656*	0.1133	0.3083	0.0649*	0.0967	0.3213	0.0652*	0.1082
UAHonors	0.3035	0.0215*	0.0986	0.3207	0.0216*	0.1051	0.3499	0.0218*	0.1228	0.3157	0.0215*	0.0992	0.3444	0.0217*	0.1167
MeritAmt	0.3481	0.0165*	0.1146	0.3580	0.0165*	0.1185	0.3535	0.0165*	0.1241	0.3215	0.0164*	0.1013	0.3173	0.0164*	0.1068
MidWest										-0.7274	0.0229*	-0.1411	-0.7262	0.0230*	-0.1588
NorthEast										-0.7997	0.0240*	-0.1490	-0.8010	0.0242*	-0.1685
South										-0.8369	0.0254*	-0.1528	-0.8401	0.0255*	-0.1731
Otheregion										-0.7559	0.0154*	-0.1444	-0.7595	0.0155*	-0.1633
West										-0.7310	0.0540*	-0.1415	-0.7377	0.0541*	-0.1604
Year2008							-0.0977	0.0146*	-0.0300				-0.0978	0.0146*	-0.0286
Year2009							-0.3233	0.0151*	-0.0908				-0.3175	0.0150*	-0.0847
OnLineAppl	-0.1928	0.0263*	-0.0520	-0.2181	0.0265*	-0.0584	-0.1646	0.0267*	-0.0493	-0.2119	0.0263*	-0.0538	-0.1591	0.0265*	-0.0455
EFC	0.1839	0.0177*	0.0575	0.1712	0.0178*	0.0535	0.2157	0.0181*	0.0732	0.1678	0.0177*	0.0501	0.2114	0.0180*	0.0690
Number of Observations Used		53,923			53,923			53,923			53,923			53,923	
* Statistically significant at 95% confidence level															

CHAPTER FIVE

SUMMARY AND CONCLUSION

The existing literature remains limited in its ability to provide a broad and comprehensive understanding on factors for predicting the likelihood of college enrollment. Considering this limitation, the current study intends to investigate and assess the likelihood of domestic-freshman enrollment choice at the University of Arizona using applicant-level data from 1999-2009.

Variables used as predictors for enrollment in this empirical work include demographics, socio-economic background characteristics, student's academic ability, standardized test scores, high school characteristics, and institutional characteristics for domestic freshman applicants admitted at the University of Arizona from 1999 to 2009. Additional explanatory variables (participation in prospective student orientation, online application and EFC) are included for 2007-2009 period. Most of the applicant level data used for the study is confidential and comes from the University of Arizona's Admissions Office. This study focuses only on domestic freshman applicants.

During 1999-2009 period 220,527 prospective domestic students applied for admission to the freshmen class at the University of Arizona. Of these, 183,916 applicants were admitted resulting in an average admissions rate of 84 percent. Of the 183,916 student admitted, 66,291 actually enrolled at the University of Arizona. This translates to an enrollment yield of 36 percent over 1999-2009 period. The 183,916 admitted students constitute the sample for the present study. The overall admission and enrollment yield remained fairly constant over the sample period.

Higher admissions yield and lower enrollment yield at the University of Arizona compared to Arizona State University and Washington State University are indicators that students perceive the University of Arizona as less selective than the other two colleges. Previous studies have determined that out-of-state students consider selectivity of colleges as an important factor for college enrollment choice.

To check for systematic differences in the enrollment yields among different groups of applicants, pooled t tests are performed. These t tests investigate whether the observed differences in the enrollment yields between two groups of applicants – for example, residents and non-residents – is due to chance variation or real. The null hypothesis of interest, in this case, would be equality of enrollment yield means between residents and non-residents. In performing these t tests we assume that population variances for both groups are equal. The assumption of normality is not critical because of large sample size. The sample average of 0.4934 for residents means that during 1999-2009 period, 49.34 percent of admitted residents actually enrolled at the University of Arizona. The average enrollment yield for non-residents is 0.2740 resulting in a test statistic absolute value of 99.21. Thus the hypothesis of no difference in enrollment yield averages for residents and non- residents is clearly rejected. Thus other things being equal, an admitted resident is almost twice as likely as non-resident to matriculate at the University of Arizona. Similar results are obtained when testing differences in enrollment yields between two groups – for example, residents and non-residents – on a yearly base. Likewise, the t-test analysis was computed for gender, ethnicity, standardized test, academic index (AI), orientation, high school type, UA Honors, merit amount offered and the geographic region of residency.

The preceding t tests, while informative, do not control for other variables when testing

for differences in the means of groups. A regression analysis is used to simultaneously control and account for the influence of various factors that affect individual's enrollment decision. Applicant level data is used for this regression analysis. A Probit model is used because the variable of interest is binary taking a value of 1 if the applicant actually enrolls at the University of Arizona, 0 if not.

Probit results strongly suggest that non-resident students are less likely to enroll at the University of Arizona than Arizona residents. This strong result suggests that other things constant, factors affecting the likelihood of enrollment in out-of-state students like selectivity should be evaluated closely. Declining in enrollment yields from 2006 to 2009 (see table 4.3) is an indicator of how out-of-state students perceive selectivity at the University of Arizona compare to other institutions. Additionally, we observe from preliminary descriptive statistics that students with lower high school GPA and lower SAT are more likely to enroll at the University of Arizona (see tables 3.6 and 3.7). We observe a slightly increase in average enrollment yield for students with high school GPA in the 3.5-4.0 level, This result is clearly related to the positive sign in admissions to the UA Honors College. Increase in the probability of enrollment at the University of Arizona in the higher band of the high school GPA should be further explore for targeting high qualified high school graduates. For instance, what are the programs they prefer?, what are the top feeder schools?, Are they Arizona high school graduates?, or what state do they come from? Predictive models assist recruitment management responding these type of questions in order to target limited resources in the right direction, maximize benefits of recruitment programs for out-state students while keeping average costs low. Although out-of-state students bring extra revenue to the University of Arizona due to the higher tuition costs, there is also a premium placed in recruiting out-of-state students. One

marketing goal the decision makers and enrollment management might want to consider is to determine how admitted applicants perceive the University of Arizona compared to its major competitors. Assessment of this result might also be important from the revenue generation standpoint. Public universities generally practice price discrimination, charging higher tuition to non-resident students. Price discrimination is made possible because non-residents' demand for higher education is thought to be much less elastic, likely because of the academic prestige factor offered by some universities, as well as other factors such as parental preference and certain academic programs. Adding variables on ethnicity do not change the results. These strong results regarding the influence of residency on enrollment seem to agree with earlier work indicating that students are more likely to attend closer to home.

Similarly, adding variables on ethnicity and geographical regions produce no change in the estimated effect of high school GPA, and standardized test scores variable SAT. Students with higher GPA, and higher SAT scores are less likely to enroll at the University of Arizona.

However, students admitted to the UA Honors College are more likely to enroll indicating that Honors College is influential in attracting quality students to the University of Arizona. This effect might be confounded with the higher financial aid and merit awards offered to Honors College admits. Expected family contribution (EFC) used as a proxy for ability to pay for college, is also statistically significant and a positive indicator of the likelihood of student's enrollment at the University of Arizona.

As expected, offering merit based financial aid has a positive effect on enrollment decision.

Students who attend orientation are more likely to enroll. This result is not surprising. Orientation is the final step on the enrollment process. It is an indicator of high commitment to

attend to college. Students who attend orientation pay for enrollment deposit and on campus housing deposit prior to the orientation session. Non-enroll decision at this point of the enrollment process is highly unlikely. Switching costs, especially for out-of-state students are high in economic terms and also in admissions process to another college.

Data limitations in this study hinder further analysis. Nonavailability of data on intended major of admitted students, actual amounts of financial aid and scholarships offered, and parents' level of education are some of the major constraints for further analysis.

A more complete analysis of enrollment decision should also include information on admitted student's alternate colleges. In particular, information on financial aid amount offered, tuition and living expenses, and reputation of competing colleges that have also admitted the applicant would be highly helpful for a comprehensive modeling of enrollment decision. Despite these data limitations, the study is able to make some important and robust conclusions regarding enrollment decisions of applicants to the University of Arizona. These results should be useful in enrollment planning and recruitment for the University of Arizona and other similar universities by analyzing student's perception on selectivity, promoting the University of Arizona Honors College and targeting non-resident directly on the states where they are more likely to enroll.

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