Student Credit Hour (SCH) Projection Model

Purpose

The SCH Projection Model will project, on a term to term basis, the number of credit hours attempted by students at Oakland Community College. This first proposal is simple but will grow in complexity if the model does not meet the needs of the institution.

Definition of SCH Within the Model

Let me preface this section with two thoughts: First, even though the unit of analysis is SCHs, headcounts are important when tracking SCHs generated by "cohorts"[1]. Secondly, because of the dynamics associated with drops, adds, withdrawals, and no shows, SCH data for this model should be obtained from sources that have factored in the majority of these cases -- and for a conservative estimate partial credits should not be included.

SCHs can be analyzed in a number of different ways and in varying detail. For example, one can analyze credits in aggregate form by combing all credits generated at each of the campuses into one model, or one might analyze credits generated at each campus -- the later being preferable if there have been significant differences in the change in enrollments/SCHs from

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[1] The use of the term **cohort** in this project will refer to students entering OCC at the same time regardless of age.

one campus to the next. Credits can also be analyzed by student subgroups/cohorts, i.e. FTIAC, transfers, and continuing students.

In short, SCHs are attached to student cohorts who are enrolled at individual campuses on a full-time or part-time basis.

Method

Grouping students with similar characteristics will be important to the accuracy of a model. For example, full-time students represent a smaller percentage of the total student population; students within the district pay less per credit than do student out of the district, etc... It will probably become necessary to further define cohorts as the model develops. Additionally, consideration might be given to looking at individual departments or curriculum clusters; however, if this approach is taken then it will be necessary to analyze SCHs at the curriculum level rather than at the student level.

The steps proposed in this model to project student credit hours are:

- ☞ Divide OCC student population into cohorts.
- ☞ Gather the actual headcounts from past semesters for each cohort.
- ☞ Compute historical retention rates and average SCHs attempted for each group.

- ☞ Obtain expected new freshmen and transfer headcounts from the Office of Admissions, as well as historical data on inquiries, applicants and matriculates. If the data do not reveal consistent patterns, then it may be necessary to develop a model for predicting new students using external variables.

- ☞ Apply retention rates to historical headcounts to get expected return headcounts for each continuing cohort.

- ☞ Compute total semester credits attempted by each cohort by multiplying expected future headcounts by expected average semester credits attempted for each cohort.

The model uses parameters which are calculated based on an average of four to five years worth of historical data. These parameters are then applied to one previous semester's data to get a forecast for some future semester. For example, the historical fall to fall retention rate for FTIAC (parameter) is applied to last year's number of fall freshmen (past actual data) to get the number of expected to return next fall (future).

Data Elements Requirements

PEOPLE FILE

STUDENT SSN.

DATE ENTERED (SEM./YR)

F.T.I.A.C/TRANSFER

~~TRANSFER IN INST.~~

CAMPUS

GENDER

BIRTHDATE (YEAR)

HIGH SCHOOL STANDING ?

CURRICULUM CODE

SEMESTER PROFILE (A file is generated for each semester coded: Semester/year --FA92, SP93, WI93, SU93)

STUDENT SSN

NUMBER OF CURRENT CREDITS ATTEMPTED

NUMBER OF TOTAL CREDITS ATTEMPTED

NUMBER OF TOTAL CREDITS EARNED

ACTIVE/INACTIVE CODE

ECONOMIC INDICATOR FILE

ANNUAL UNEMPLOYMENT RATE (Oakland County if Possible)

INFLATION RATE

APPLICATION FILE (Applications each year for following Fall)

YEAR

NUMBER OF INQUIRES

NUMBER OF APPLICATIONS

NUMBER OF MATRICULATES

HIGH SCHOOL GRADUATION FILE

NUMBER OF HIGH SCHOOL GRADUATES

PROJECTION OF HIGH SCHOOL GRADUATES

Worksheet Design and Definitions

Each row of the Excel worksheet is a subgroup of the student population for each campus for each curriculum cluster. The column definitions are as follows:

LASTYR# is the actual past headcount for that subgroup.

%RETENT is the historical average retention rate for that subgroup.

EXPECTED# is the expected headcount for the future semester based on the following formula: Continuing students is Lastyr# * %Retent. New Freshmen and Transfer figure is based on Admissions Data or may be calculated using high school graduation rates, inquiries and/or number of applications.

AVG.SCH is the historical average semester credits attempted for that semester for that subgroup.

TOTSCH is the predicted total semester credits attempted for that subgroup (Expected# * Avg.Sch)

Example:

Orchard Ridge

FTIAC		Expected#	Avg.SCH	TotSCH
	Full-Time			
	Part-Time			
1st Year Transfers				
	Full-Time			
	Part-Time			

Continuing Students	Lastyr#	%Retent	Expected#	Avg.SCH	TotSCH
Total 2nd Yr.(last years FTIAC)					
Full-Time					
Part-Time					
Total 3rd Yr.(last years 2nd yr)					
Full-Time					
Part-Time					

BUSINESS REPORTS

JULY 1996

Education

TOUGH TIMES FOR TWO-YEAR SCHOOLS

A strong economy can mean bad news for community colleges.

Even slight improvements to the economy are good for most businesses, but not for the nation's community colleges. While college enrollment as a whole is expected to increase in the next ten years, many two-year colleges are preparing for lean times ahead.

Members of the large baby-boomlet generation, the oldest of whom are aged 19 this year, should boost college enrollment over the next decade. And an improved economy may create more part-time jobs, which many believe will allow students to enroll who might otherwise have had to postpone college. The National Center for Education Statistics projects that community college enrollment may increase at an annual rate of 1.1 percent between 1994 and 2006, to 6.2 million.

The promise of higher earnings over a lifetime can't entice many students to community colleges when full-time jobs are available.

Yet these projections may be overly optimistic, according to a recent survey of community colleges in 24 states by the American Council on Education (ACE). Its study found that 62 percent of colleges in these states posted a drop in enrollment for the 1995 fall term. Wisconsin's community colleges had the greatest decline, at almost 6 percent. Fourteen other states experienced two-year enrollment declines, including Connecticut, Hawaii, Louisiana, Missouri, and Ohio.

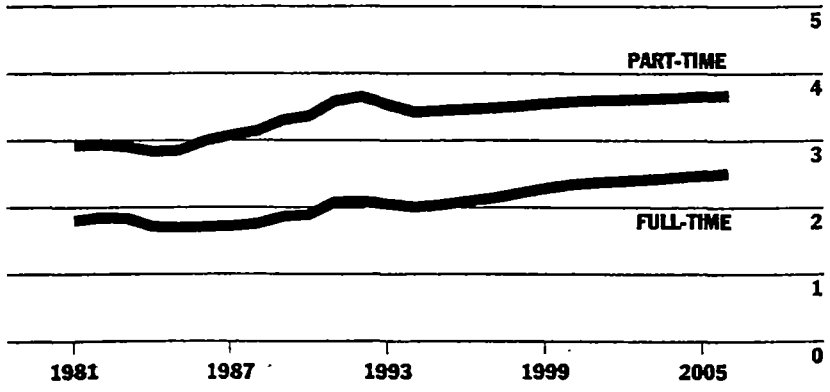
"Our colleges historically have noted a correlation between enrollment and the health of the national economy," says Dr. David R. Pierce, president of the American Association of Community Colleges, in the January issue of *Community College Week*. "An improved economy actually correlates to a drop in enrollment, not an increase." A healthy economy means full-time work for many high school graduates, says Dave Hursh, editor of *Inside CCC*, published by Corning Community College in Corning, New York. When work is readily available, many students who would otherwise enroll in community college decide that a full-time job is a better immediate option.

Income generally increases with educational attainment, including those with some college but no degree. But even the promise of higher earnings over a lifetime can't entice many students to community colleges when full-time jobs are available. This may be especially true for nontraditional students—those aged 25 and older—who are making up larger

Modest Growth for Community Colleges

Community college enrollment dipped during the recession in the early 1990s, but it is expected to increase moderately into the next century.

(enrollment in two-year colleges and projected enrollment, by full-or part-time status, 1981-2006; numbers in millions)



Source: National Center for Education Statistics

BUSINESS REPORTS

shares of community college enrollment.

Of the 24 states surveyed by ACE, two are bucking the downward trend in a big way. Community college enrollment in Arkansas increased about 9 percent between fall 1994 and fall 1995, while Nevada posted an increase of over 12 percent. Growth is even more striking at the Community College of Southern Nevada (CCSN) in Las Vegas. Enrollment increased 21 percent between fall 1994 and fall 1995. Spring 1996 enrollment, which is typically lower than for fall sessions, rose another 8 percent. At 22,500,

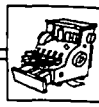
Community college enrollment increased in Arkansas and Nevada.

total enrollment at the community college is higher than for its well-known four-year neighbor, the University of Nevada-Las Vegas.

John Kuminecz, director of public affairs for CCSN, says the college's growth reflects the Las Vegas boom. The Las Vegas metropolitan area is the nation's fastest-growing metro. Its population increased 26 percent between July 1990 and July 1994, to 1.1 million, according to the Census Bureau. In addition, the college has adapted its course schedule to meet the needs of the thousands of workers who keep Las Vegas humming 24 hours a day. CCSN offers courses seven days a week and is open more than 12 hours a day.

For more information, contact the American Council on Education, 1 Dupont Circle NW, Suite 800, Washington, DC 20036; telephone (202) 939-9300. Enrollment projections are published in *Projections of Education Statistics to 2006*, document No. NCES 96-661, available from the Government Printing Office, Washington, DC 20402-9328; telephone (202) 512-1800.

—*Carole Hedden*



Retail

WHAT IS AN OUTLET CENTER?

Huge off-price shopping malls could become the victims of their own success.

You're driving on an interstate heading out on vacation. You've been on the road for three hours. You're tired. Suddenly, you get the urge to pull over and—do some bargain shopping?

Discount malls, also known as outlet centers, are often situated far from residential communities. They are a strange but successful phenomenon in the troubled world of retailing. America's 294 outlet centers anchored total outlet sales of $11.4 billion in 1994, according to *Value Retail News*. In 1990, there were just 183 centers and sales of $6.3 billion.

What makes a huge shopping mall in a rural area so appealing to consumers? It isn't just the promise of great deals. In fact, there are three general rules for the successful development of outlet centers. First, successful outlet centers are located at least 18 to 20 miles away from the manufacturer's major wholesale accounts. This rule keeps ordinary shopping malls happy. It's one reason why large outlet centers exist at vacation spots like Freeport, Maine, or Lake Tahoe, Nevada. These sites don't have traditional retail malls, but they do have millions of affluent visitors. "You'll shop because you want a break from the lakes or beach and you want to experience commerce," says Mark Kissel, a retail consultant for Kissel Consulting Group in Rockville, Maryland. "Or the weather is rotten, so you go to the outlet mall to do some shopping."

Second, outlet centers are located at "pass-by" locations. They are found on major highways between metropolitan markets, or between a market and a tourist site. One major outlet center is in tiny

Ad Hoc Committee:

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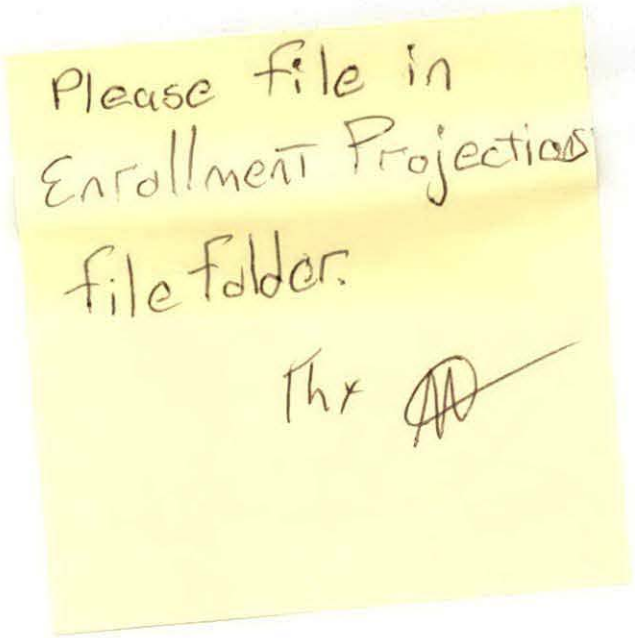
Programmer
Marketing Committee Member
Economics faculty

FTE Calculation (15.5 or 31)
Population 17 -> 99?
OCC image index
Consummer confidence index (UofM)



DETERMINANTS OF COMMUNITY COLLEGE ENROLLMENT

A STUDY OF ENROLLMENT PATTERNS AT MARYLAND COMMUNITY COLLEGES

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DETERMINANTS OF COMMUNITY COLLEGE ENROLLMENT

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INTRODUCTION

The intention of this paper is to increase our understanding of the determinants of community college enrollment. Specifically, there are three questions of interest. First, what are the factors that influence community college enrollments? Second, what is the relative importance of each of these factors? Third, how can this information be utilized to build a better predictive enrollment model? Hopefully, the information revealed through this analysis and others like it will aid us as we attempt to understand and build better predictive models of community college enrollments. Additionally, this study may help us understand how the factors which influence community college enrollments differ from those of four year colleges and universities given their different missions and potential students.

While there is some general agreement on the factors that influence enrollment levels in higher education, and there is a good deal of empirical evidence to support those assertions, the number of specified empirical models that exist are relatively few. Further, and most importantly for our purposes what does exist focuses primarily on four year institutions. While factors influencing enrollment levels and the decision to attend college may be the same for all institutions of higher education, it would seem that the most reasonable way to approach the issue would be to consider each segment of higher education specifically to account for the different specifications a model might take depending upon the type of college. This point seems reasonable when we consider that most four year institutions are concerned primarily with enrollment management while for community colleges the focus has been more of the attempting to estimate the demand for their services in the community. The perspectives of both are based on the missions of the institutions. For community colleges that are open enrollment institutions as part of their mission, the focus on growth and expansion should not be surprising. The focus on growth should be even more pronounced if the funding of a particular college is based on the number of students it enrolls.

FACTORS INFLUENCING ENROLLMENT

Many of the factors considered plausible determinants of enrollment have relative agreement in a wide range of the academic literature as well as among practitioners. These may be categorized as the potential market size, cost of attending and alternative opportunities. These appear in almost all studies and discussions of enrollment either directly or implicitly. Additionally, the current enrollment of an institution is an important factor in considering overall enrollment levels. Clearly this is why enrollment management systems focus on

retention as a core component of their system (Bean, 1986). Finally, to the external factors and current enrollments we must add other structural considerations and systemic changes over time. Institution specific factors such as size, educational offerings, and prestige of the institution might influence enrollments, and in a time series analysis structural changes such as regulation, entrance requirements, or state aid availabilities that occur over time should be included (St. John, p.161-162).

Potential Market

Perhaps the most important and obvious determinant of enrollment is the size of the potential market. All models begin with this basic component and the decline in high school enrollments was seen as important enough in itself to be a predictor of college enrollment declines in the 1980's. (Dickey, Asher, Tweddale, p.1-2). The potential market for an institution is directly related to its type and mission. While for many colleges and universities high school enrollment levels with additional criteria are important indicators of potential markets, for community colleges the population of a given service area would appear to be a more appropriate indicator. While community colleges do attract a considerable proportion of the traditional college age students within a given service area, they also attract a very high percentage of non-traditional students and part time students. Additionally, the number of high school graduates in a given area should be highly correlated to the total population of the service area. Given this consideration it seems that for community colleges the best determinant of potential market would be the size of the population of their service area.

The importance of the market population in community college enrollment models is underscored by the strong emphasis on cohort analysis as a means for predicting community college enrollments. In these models, the characteristics of past cohorts are identified and future enrollments are based on the changes in the population with those characteristics (Clagget, 1990; Heacock, 1993). Demographic considerations such as race, gender, and age are the most often used characteristics. Other variations of these models have developed as institution specific factors are added to the model (Weissman, 1994).

Costs of Attending

The cost of attending an institution is also an important factor in determining the level of student enrollment. Studies of the importance of pricing decisions on college enrollments are common in the literature, but again they focus primarily on four year institutions and not community colleges (Chatman, 1994; Litten, 1984; St. John, 1990). The common wisdom and accepted wisdom hold that as the cost of attending an institution increases then the demand will decrease. Arguments over the elasticity of the demand curve have been at the center of debate concerning what increases in tuition do to overall enrollments and how pricing should be set. The cost of attending college is a complex matter that involves tuition costs, books, fees, transportation, etc. These costs; however, are offset by financial aid programs, student loans, and employer based education programs. The influence of price

changes on enrollment levels at colleges is not clear. While most community colleges have relatively low tuition compared to four year institutions, they also tend to serve the poorer segments of the population.

Alternative Opportunities

Alternative opportunities are also important considerations as determinants of enrollment. Potential students have different choices when considering enrollment in college - enroll in your college, enroll in another college, don't enroll at all. Therefore we consider here two primary alternatives to attending a community college - economic conditions and competition.

Economic conditions would lead to different opportunities for potential students in the community. (Dickey, Asher, Tweddale, p.11) As the economy worsens and unemployment rises potential students will be affected in two ways. First, they may have less money to spend on college and may be less willing to spend it given economic uncertainties. Second, they may also have fewer employment opportunities. This effects people looking for their first job, those who loose their jobs as well as those who find themselves with limited job prospects and require retraining. Thus in bad economic times for the work force - here defined as times of high unemployment as opposed to high inflation, the number of potential students who choose a community college should increase. Community colleges are cheaper and students may choose them in lieu of a more expensive four-year institution and potential students may choose the college as the number of employment opportunities dwindle.

Competition for the pool of potential students is also an important factor. In this sense it is used here, competition refers to other educational institutions that students could choose as a substitute. Enrollment management systems and college admissions officers are well acquainted with the importance of marketing their institutions effectively and setting themselves apart from the competition (Kuh and Wallman, p. 63). For community colleges the marketing and competition problems may be different from four year institutions. Four year colleges for the most part recruit from larger areas than community colleges who tend to focus on a local market rather than a state or national market. Additionally, while four year institutions may face competition from colleges and universities who are "most like them," for community colleges the competition is most likely to be based on location.

Structural Variables

Finally, a set of structural factors also need to be considered. These factors will allow us to consider some institution specific factors as well as the changes that occur within the environment over time. For example, enrollments within individual colleges are likely to vary in relationship to the external market based upon their program offerings at the college. Colleges with a variety of programs may be more likely to increase enrollments at the expense of institutions with limited programs. This is also the case with the available facilities at the college. Structural changes in the region in which the college is located may also need to be included. Colleges in Maryland as well as other regions will change in

relationship to the structural changes in the state. As state oversight of education increased in the 1980's, and state funding of higher education changed, numerous structural changes occurred which could effect individual college enrollments.

The inclusion of institution specific and structural factors to better predict enrollments can be found at many institutions (Campbell, et al., 1984; Weissman, 1994). Their inclusion in a more general model of enrollment determinants is extremely important because the influence of the general external factors may be altered by these institution specific variables. To properly construct and specify a model requires that we make some attempt to include them in our model.

Figure I: Maryland Community College Credit Enrollment shows the total credit FTE enrollment in Maryland community colleges from 1975 to 1994. Clearly, from this figure the credit FTE within the system has fluctuated widely over the period. Some of this is due to the increasing market and some to economic conditions. However, other changes, especially steady increases do not appear to be related to either of these factors. Additionally, the colleges within the system move together for the most part whatever their location within the state. That is, when enrollments begin to rise, they rise at almost all the colleges in the system. Part of the reason for these changes seems to lie within structural changes in the state.

METHODOLOGY

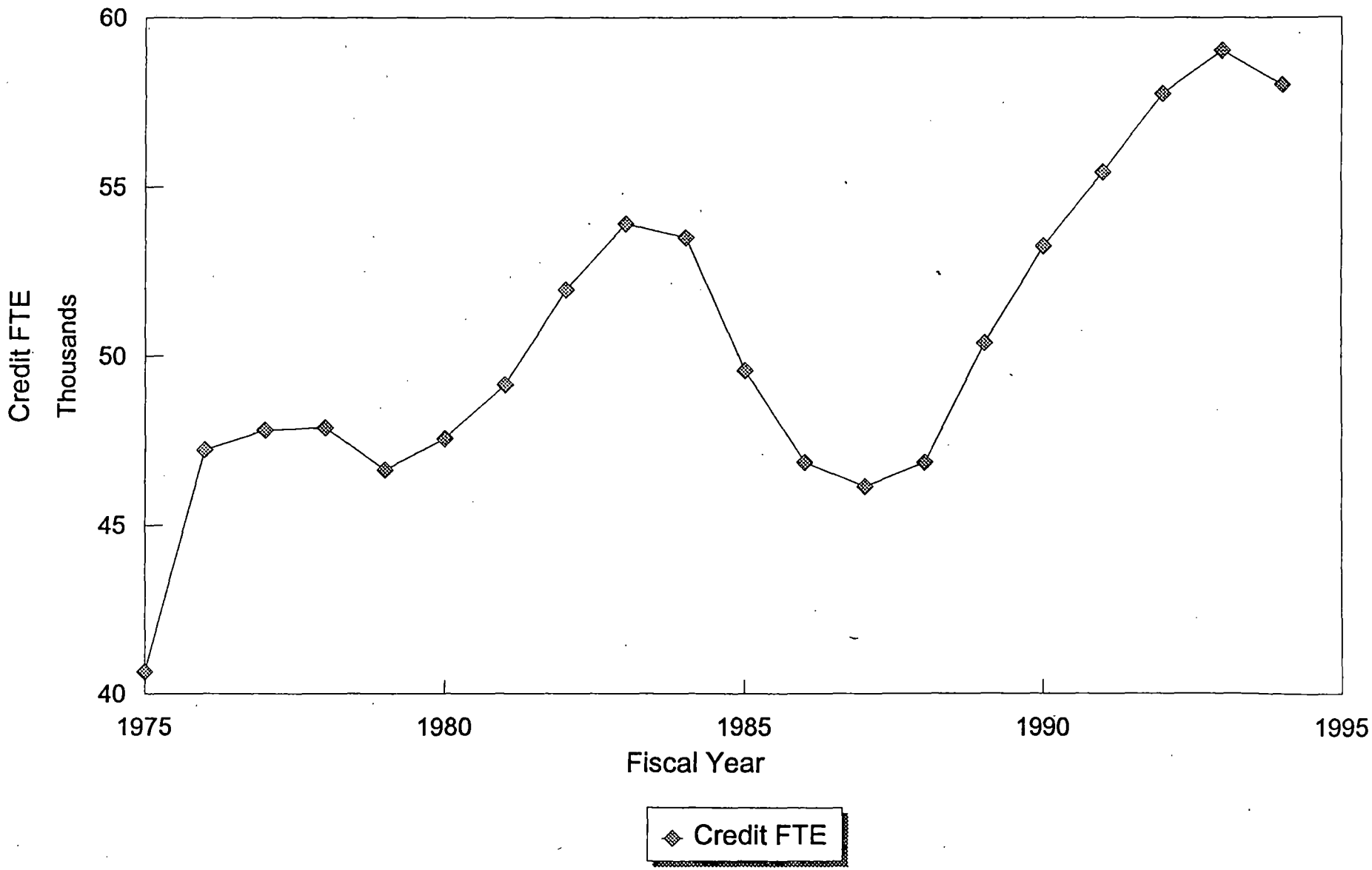
This study employs a linear regression analysis using a longitudinal cross-sectional approach that considers the credit enrollment at individual Maryland community colleges over a fourteen year period. A total of sixteen community colleges were considered in the study, although three colleges within one county were combined into a single observable unit for study purposes. Therefore, the study design provides us with a total of 196 observations. The operationalized variables used in the model for the factors discussed previously are as follows.

Dependent Variable:

Fall FTE: Fall full-time equivalent enrollment at the community college. This was calculated by dividing the total credit hours by thirty for an annualized FTE.

Figure 1: Maryland Community College Credit Enrollment

FY 1975 to FY 1994



Independent Variables:

Spring FTE: Current enrollment at the community college is incorporated into the model by using Spring semester full-time equivalent enrollment at the community college. This was calculated by dividing the total credit hours by thirty for an annualized FTE.

Service Area Population: The adult population (16 and older) of the service area was used to represent the potential market for community colleges and is based on records and projections of the Maryland Department of Planning. Individual college service area populations were determined by the counties in their service area. Most community colleges in Maryland serve a single county and thus population calculations are straightforward. Others serve multiple counties and these were totaled to obtain the entire service area population. Baltimore county has three separate community colleges with a single board of trustees and tuition rate. For the purposes of this study they were traced as a single community college. Since community colleges in Maryland serve specific counties and are required by law to charge higher out-of-county tuition rates, the use of county population for area seems reasonable. Population should be positively related to enrollment growth.

High school graduation rates within the counties were considered as a variable for potential students and rejected for two reasons. First, based on cohort studies high school graduates form just one segment of a community college's student population. Second, high school graduation levels correlate very highly with service area populations. Using the high school figures in lieu of the population would not fully represent the potential market while using both variables would cause serious multicolinearity problems within the model.

Tuition: The cost of attending the college was operationalized as the tuition rates charged at the community college. Specifically, Tuition rates are defined as the cost of one credit hour for an in-service area student. No fees were included in the costs. Tuition costs were also corrected for inflation so they are represented in constant dollars. Financial aid to offset tuition costs was not considered for two reasons. First, most community colleges in the state provide very little in terms of local scholarships and aid to students. Second, the financial aid that is offered comes from state and federal sources and is the same for all colleges in the state. Tuition should be inversely related to enrollment growth.

Economic Conditions - Unemployment: Unemployment rates within the service area was chosen as the primary indicator of economic conditions. For each service area, the unemployment rate was computed as the average for the period January through August preceding the fall semester. The intent of this calculation was to provide an overall sense of the economic condition of the service area prior to the fall semester. Unemployment should be positively related to enrollment growth.

Competition: Competition was defined as the location of another institution of higher education within easy communing distance of the college that also had reasonably competitive rates. Colleges were considered in a zone of competition if a public institution was located within easy commuting distance with the exception of other community colleges. Private institutions were not included as their tuition rates are extremely high. A binary variable was used to indicate the presence of competition. The variable should be inversely related to enrollment.

Two structural variables were also incorporated into the model - reform and size. The first captures change over time, while the second addresses differences among the set of colleges.

Reform: In 1988 the state of Maryland reorganized its higher education system. Four year institutions raised their tuition and many increased their entrance requirements. It has been argued that this structural shift in higher education in the state had the impact of lowering enrollments at four year institutions and increasing them at two year institutions. A binary variable is designed to account for the differences between the two periods in time. The variable should be positively related to enrollment.

Small: Small community colleges have limited programs and facilities and may not be able to attract all of the potential students in their area due to their limited program offerings. The size variable is a binary variable that denotes small community colleges. This variable is designed to capture the difference between large and small schools in terms of the interaction of different effects based on college size. A binary variable was used to represent the small colleges in the state. The classification of small is based upon one employed by the Maryland Association of Community Colleges. The variable should be inversely related to enrollment.

MODEL SPECIFICATION

A standard regression analysis was employed for the models based on the above variables. As specified the model incorporates current enrollment into the model using a mathematical relationship. A new dependent variable is computed by subtracting the half the prior spring enrollment from the fall enrollment. The new variable ALTFTE is computed as:

$$ALTFTE = FallFTE - .5*SpringFTE$$

This specification was chosen for two reasons. First, the correlation between spring and fall enrollments is so high that all other effects are eliminated from the model. Second, studies in the Maryland community college system that were available show the overall average retention rate from fall to spring to be approximately fifty percent. Leaving the current enrollment variable out of the model has no effect at all on the results obtained in the findings in terms of the significance of any variable. What it does do is reduce the impact of

each variable considered. For this reason, it seems important to keep the variable in the model.

A total of eight models were run to consider different specifications of the independent variables. In all of the eight models, the **Population, Tuition** and **Unemployment** variables were included in the model. The **Reform, Small** and **Competition** variables were included in different combinations in the eight models. The first three variables were included in each model as they are the most generally accepted variables in the literature. The latter three are included in various combinations to ascertain their interaction with the other variables.

RESULTS

The results of all the models can be found in **Table I: Summary of Findings.** This table reports the beta-coefficients for each model as well as the probability of the factor occurring by chance. We will employ a .95 confidence level to determine the significance of a variable in the model in our discussions.

Each of the models introduced has a relatively high explanatory value with the R^2 ranging from .912 to .920. Given these values and their minimal variation we will confine our discussions that follow to the individual variables in the models.

Model I incorporates the **Population, Tuition** and **Unemployment** variables alone to predict adjusted fall enrollment **ALTFTE.** As can be seen, the population of the service area is significant as is the level of unemployment and both are in the correct direction. The **Population** coefficient indicates that every thousand persons in the population produce 3.814 FTE. **Unemployment** is also positively related to enrollment and every point in unemployment produces 13.758 FTE. **Tuition,** on the other hand is not significant and the value of the coefficient is in the wrong direction, which is as tuition rises its impact on FTE is positive.

In **Model II** the **Reform** binary variable is introduced. This variable is designed to show two different periods of time and account for the differences. In this model **Population** remains significant, **Unemployment** becomes insignificant and **Tuition** remains insignificant although the probability of its impact by chance falls considerably and its beta value is in the hypothesized direction. The **Reform** variable is not significant although its probability is extremely low at .0601

Model III adds the final structural variable to the equation and it demonstrates the importance of the size factor. In this model all of the variables are significant with the exception of the intercept term. Further the beta-coefficients are all in the correct direction. **Population** has a beta value of 3.697 approximately the same as in the previous models. **Tuition** has a beta value of -7.219, double the last model but now significant.

TABLE I
SUMMARY OF FINDINGS

DEPENDENT VARIABLE: ALTFTE = FallFTE - .5*SpringFTE

VARIABLE	MODEL I	MODEL II	MODEL III	MODEL IV	MODEL V	MODEL VI	MODEL VII	MODEL VIII
Constant	-222.33 (.0150)	-120.74 (.2508)	37.26 (.7329)	36.79 (.7367)	-138.23 (.13)	-137.53 (.1418)	-217.97 (.0185)	-120.28 (.2546)
Population	3.814 (.000)	3.834 (.000)	3.697 (.000)	3.677 (.000)	3.69 (.000)	3.69 (.000)	3.82 (.000)	3.837 (.000)
Tuition	.354 (.8384)	-3.925 (.1689)	-7.219 (.0128)	-7.40 (.018)	-.471 (.785)	-.467 (.786)	.367 (.8325)	-3.89 (.1759)
Unemployment	13.758 (.0488)	12.44 (.0742)	16.096 (.0182)	16.25 (.0175)	17.280 (.012)	17.251 (.013)	13.64 (.049)	12.42 (.0756)
Reform	--- -	122.47 (.0601)	187.57 (.0042)	191.88 (.0039)	--- -	--- -	--- -	121.847 (.0644)
Small	--- -	--- -	-182.24 (.001)	-184.596 (.0001)	-147.36 (. 0016)	-147.11 (.0017)	--- -	--- -
Competition	--- -	--- -	--- -	17.58 (.6845)	--- -	-2.75 (.949)	-14.23 (.7484)	-3.17 (.9431)
R	.955	.956	.959	.959	.9576	.957	.955	.956
R^2	.912	.914	.920	.920	.9169	.917	.912	.914
R^2Adjusted	.911	.912	.918	.917	.9152	.914	.9108	.912

findtab3.tbl

Unemployment increased its beta-vale to 16.096. **Reform** and **Small** are also significant with respective beta values of 187 and -182.

Model III adds the last variable to the model **Competition.** All of the variables contained in the previous model remain significant and in the posited direction. **Population** has a beta value of 3.677 approximately the same as in the previous models. **Tuition** has a beta value of -7.40, approximately the same as in the previous models. **Unemployment** remains almost the same with a beta-value of 16.25. **Reform** and **Small** are also significant with respective beta values of 191.88 and -184.596 that are similar in value to the last model. The only variable that is not significant is the newly introduced **Competition** variable.

Models V through VIII introduce various combinations of the **Reform, Small** and **Competition** variables. None of the models provides any additional information or raises the predictive power of the previous models. Interestingly enough though, the introduction of different combinations has no impact on the significance of the **Population** variable. The **Unemployment** variable is also significant in three of the four final models. **Tuition,** on the other hand is insignificant in every model. The **Small** variable is significant in each model where it is introduced, while the **Competition** variable is never significant. The **Reform** variable is only introduced once in the last four models and it is similar in its impact to that in Model II in value and probability value. While it is insignificant, it is just slightly so.

Clearly the interaction of the generally excepted factors that determine enrollment with the structural variables proposed in **Model III** provide us with the most interesting results. The model with most predictive power seems to be **Model III.** It includes the **Population** variable that is significant in every model tested. It also includes **Unemployment** which is significant in six of the eight models tested. The **Tuition** variable is also included in this model and is significant in only two of the models tested. Additionally, it includes two structural variables - **Reform** and **Small** which are also significant.

CONCLUSIONS

The results of the regression equations lead us to the conclusion that the traditional factors associated with predicting and explaining enrollment levels have the hypothesized effect with some caveats. ***The interesting fact is that some of these variables only became significant when we were unable to uncover certain specific structural changes and characteristics within the system that would lead to alterations in the model.*** Service area population is clearly the most impressive factor in community college enrollments. Its impact is so robust that it is significant regardless of the model specified. Unemployment is almost as robust, while the effect of tuition rates is open to some doubt.

The inclusion of specific structural factors individual to some systems and times is an important part of the correct specification of enrollment models and undoubtedly demonstrates the interesting interactions that can occur. As the study of community college

enrollment models proceeds we must pay careful attention to the difficulty of alternative specifications of the models to further clarify the impact of different factors.

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Student Credit Hour (SCH) Projection Model

on a term or AY/FY basis?

Purpose

The SCH Projection Model will project the number of credit hours attempted by students at Oakland ~~County~~ Community College. This first proposal is simple but will grow in complexity if the model does not meet the needs of the institution.

Definition of SCH Within the Model

Let me preface this section with two thoughts: First, even though the unit of analysis is SCHs, headcounts are important when tracking SCHs generated by "cohorts"[1]. Secondly, because of the dynamics associated with drops, adds, withdrawals, and no shows, SCH data for this model should be obtained from sources that have factored in the majority of these cases -- and for a conservative estimate partial credits should not be included.

1/10 day

SCHs can be analyzed in a number of different ways and in varying detail. For example, one can analyze credits in aggregate form by combing all credits generated at each of the campuses into one model, or one might analyze credits generated at each campus -- the later being preferable if there have been significant differences in the change in enrollments/SCHs from

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[1] The use of the term **cohort** in this project will refer to students entering OCCC at the same time regardless of age.

one campus to the next. Credits can also be analyzed by student subgroups/cohorts, i.e. FTIAC, transfers, and continuing students.

In short, SCHs are attached to student cohorts who are enrolled at individual campuses on a full-time or part-time basis.

Method

Grouping students with similar characteristics will be important to the accuracy of a model. For example, full-time students represent a smaller percentage of the total student population; students within the district pay less per credit than do student out of the district, etc... It will probably become necessary to further define cohorts as the model develops. Additionally, consideration might be given to looking at individual departments or curriculum clusters; however, if this approach is taken then it will be necessary to anlayze SCHs at the course level rather than at the student level.

curriculum

The steps proposed in this model to project student credit hours are:

- Divide OCCC student population into cohorts.
- Gather the actual headcounts from past semesters for each cohort.
- Compute historical retention rates and average SCHs attempted for each group.

- Obtain expected new freshmen and transfer headcounts from Office of Admissions, as well as historical data on inquiries, applicants and matriculates. If data do not reveal a consistent pattern, then it may be necessary to develop a model for predicting new students using external variables.

- Apply retention rates to historical headcounts to get expected return headcounts for each continuing cohort.

- Compute total semester credits attempted by each cohort by multiplying expected future headcounts by expected average semester credits attempted for each cohort.

The model uses parameters which are calculated based on an average of four to five years worth of historical data. These parameters are then applied to one previous semester's data to get a forecast for some future semester. For example, the historical fall to fall retention rate for FTIAC (parameter) is applied to last year's number of fall freshmen (past actual data) to get the number of expected to return next fall (future).

Data Elements Requirements

<u>External</u> (for the last 5 yrs)

Number of high school graduates within Oakland county. (source: Admissions Office or State Department of Education)

A projected number of high school graduates within Oakland county. (source: State Department of Education)

<u>Internal</u> (for the last 5 yrs)

Annual inquiries. (source: Admissions Office)

Annual Applicants. (source: Admissions Office)

Number Matriculates. (source: Admissions Office)

Headcounts and SCH's for each cohort -- FTIAC, Transfers,

continuing students. (source: existing IR data files or Registrar's Office)

Full-/Part-time status. (source: existing IR data files or Registrar's Office)

Gender. (source: existing IR data files or Registrar's Office)

Campus Code. (source: existing IR data files or Registrar's Office)

Curriculum ~~Major~~. (source: existing IR data files or Registrar's Office)

Worksheet Design and Definitions

Each row of the Excel worksheet is a subgroup of the student population for each campus for each curriculum cluster. The column definitions are as follows:

LASTYR# is the actual past headcount for that subgroup.

%RETENT is the historical average retention rate for that subgroup.

EXPECTED# is the expected headcount for the future semester based on the following formula: Continuing students is Lastyr# * %Retent. New Freshmen and Transfers is based on Admissions Data or is calculated using high school graduation rates, inquiries numbers and/or number of applications.

AVG.SCH is the historical average semester credits attempted for that semester for that subgroup.

TOTSCH is the predicted total semester credits attempted for that subgroup (Expected# * Avg.Sch)

Example:

Orchard Ridge

FTIAC		Expected#	Avg.SCH	TotSCH
	Full-Time			
	Part-Time			
1st Year Transfers				
	Full-Time			
	Part-Time			

Continuing Students	Lastyr#	%Retent	Expected#	Avg.SCH	TotSCH
Total 2nd Yr.(last years FTIAC)					
Full-Time					
Part-Time					
Total 3rd Yr.(last years 2nd yr)					
Full-Time					
Part-Time					

1990 Enrollment by Race at 3,000 Institutions of Higher Education—Continued

	American Indian	Asian	Black	Hispanic	White	Foreign	Total
WASHINGTON—Cont.							
Everett CC	3.3%	3.6%	0.8%	1.8%	90.3%	0.3%	6,048
Evergreen St C	2.3	3.7	2.5	2.1	89.5	0.0	3,339
Gonzaga U	1.0	3.4	0.8	1.9	88.0	4.9	3,830
Grays Harbor C	3.5	0.8	0.3	0.8	94.5	0.1	2,400
Green River CC	1.1	2.6	1.2	1.1	94.0	0.1	5,894
Griffin C	1.0	8.9	16.8	2.1	65.5	5.7	1,456
Heritage C	12.8	5.5	1.1	14.9	65.6	0.0	966
Highline CC	1.2	6.9	3.2	1.7	86.8	0.1	7,734
Lower Columbia C	1.2	1.4	0.4	1.4	95.6	0.1	3,407
Lutheran Bible Inst Seattle	0.0	2.7	0.7	0.0	87.8	8.8	148
Northwest C of the Assemblies of God	1.3	3.4	0.7	1.6	90.5	2.5	681
Northwest Inst of Acupuncture and Oriental Medicine	3.1	0.0	0.0	2.0	94.9	0.0	98
Olympic C	1.7	5.8	2.5	2.1	87.8	0.1	6,003
Pacific Lutheran U	0.9	3.8	1.4	1.3	89.9	2.7	3,649
Peninsula C	3.9	2.0	2.2	1.2	90.1	0.7	2,716
Pierce C	1.4	5.3	10.0	4.2	78.9	0.3	8,502
Puget Sound Christian C	0.0	1.4	2.9	0.0	95.7	0.0	70
Saint Martin's C	0.4	5.5	4.8	2.3	85.8	1.2	1,072
Seattle CC Dist							
North Seattle CC	1.2	11.4	3.1	1.9	82.2	0.2	6,720
Seattle Central CC	1.6	15.3	13.3	2.8	66.9	0.2	6,159
Seattle CC South	1.7	15.0	7.4	2.4	73.1	0.4	5,118
Seattle Pacific U	0.5	4.2	0.9	1.1	89.7	3.7	3,421
Seattle U	0.7	8.9	2.4	1.3	77.9	8.8	4,633
Shoreline CC	1.1	8.6	1.4	1.7	86.9	0.4	6,421
Skagit Valley C	1.5	2.5	1.0	3.4	91.4	0.2	5,144
South Puget Sound CC	1.6	5.4	1.2	2.0	89.7	0.1	3,980
Tacoma CC	1.7	6.2	7.8	2.6	81.6	0.0	4,612
U of Puget Sound	0.5	5.2	1.6	1.5	90.4	0.7	4,250
U of Washington	1.1	14.0	3.2	2.3	74.5	5.0	33,854
Walla Walla C	0.3	4.2	1.5	3.6	84.9	5.6	1,566
Walla Walla CC	2.1	1.1	6.5	5.5	84.1	0.8	4,115
Washington St CC Dist 17							
Spokane CC	2.5	1.9	1.0	1.4	93.1	0.2	6,318
Spokane Falls CC	2.6	2.3	1.7	1.5	91.9	0.1	10,404
Washington St U	0.8	4.0	1.5	1.5	86.2	6.0	18,412
Wenatchee Valley C	3.8	1.3	0.6	2.0	92.1	0.2	2,492
Western Washington U	1.4	3.9	1.3	1.5	90.3	1.5	9,730
Whatcom CC	1.8	2.0	0.8	2.0	92.6	0.8	2,700
Whitman C	0.5	5.5	1.2	1.1	89.2	2.5	1,300
Whitworth C	0.5	2.0	1.0	1.2	93.5	1.8	1,759
Yakima Valley CC	4.0	1.1	1.0	11.1	82.7	0.2	4,075
WEST VIRGINIA							
Alderson Broaddus C	0.1%	1.7%	4.2%	1.1%	90.3%	2.6%	744
Appalachian Bible C	0.5	3.8	1.4	0.5	92.0	1.9	212
Beckley C	0.2	0.4	5.5	0.2	93.8	0.1	1,942
Bethany C	0.1	0.7	2.4	0.2	91.2	4.7	859
Davis & Elkins C	1.3%	1.6%	3.3%	1.1%	90.8%	1.9%	892
Huntington JC of Business	0.0	1.9	11.2	0.0	87.0	0.0	483
National Education Ctr National Inst of Tech	0.0	0.0	6.1	0.0	93.9	0.0	377
Ohio Valley C	0.0	0.5	2.9	0.0	94.6	2.0	205
Salem-Teikyo U	0.0	0.2	8.4	3.1	49.7	38.6	523
St C Sys of West Virginia							
Bluefield St C	0.2	0.3	7.0	0.2	91.9	0.5	2,702
Concord C	0.1	0.4	3.7	0.2	94.9	0.7	2,651
Fairmont St C	0.2	0.2	2.3	0.4	96.0	0.8	6,305
Glenville St C	0.0	1.2	2.1	0.2	96.2	0.2	2,238
Shepherd C	0.4	0.4	2.2	0.6	96.5	0.0	3,694
West Liberty St C	0.0	0.2	1.5	0.3	97.3	0.8	2,386
West Virginia Inst of Tech	0.1	0.5	5.5	0.4	90.5	3.0	2,898
West Virginia St C	0.2	0.4	12.2	0.3	86.6	0.4	4,834
Southern West Virginia CC	0.1	0.3	1.8	0.1	97.6	0.0	2,911
West Virginia Northern CC	0.1	0.6	2.8	0.3	95.9	0.2	2,884
U of Charleston	0.2	0.3	2.9	0.5	93.8	2.3	1,420
U of West Virginia Sys							
Marshall U	0.1	0.6	3.3	0.3	94.9	0.8	12,407
C of Graduate Studies	0.3	0.9	3.9	0.4	94.2	0.3	2,153
West Virginia U	0.1	1.6	2.8	0.6	90.6	4.4	20,854
Potomac St C	0.7	0.1	9.1	0.6	89.2	0.3	1,348
WVa U Parkersburg	0.2	0.6	0.6	0.2	98.4	0.0	3,603
West Virginia Sch of Osteopathic Medicine	0.4	3.3	1.7	2.1	92.5	0.0	240
West Virginia Wesleyan C	0.1	1.2	4.7	0.4	90.5	3.1	1,629
Wheeling Jesuit C	0.0	0.7	1.1	0.4	94.7	3.0	1,396
WISCONSIN							
Alverno C	0.6%	0.9%	13.3%	3.9%	80.9%	0.5%	2,414
Beloit C	0.0	3.7	2.8	0.9	86.7	5.9	1,169
Blackhawk Tech C	0.3	0.2	1.7	0.3	97.6	0.0	2,151
Cardinal Stritch C	0.4	1.0	5.2	0.8	92.6	0.0	3,649
Carroll C	0.1	1.3	2.6	1.8	93.4	0.9	2,196
Carthage C	0.2	1.0	6.5	1.9	90.4	0.1	1,451
Chippewa Valley Tech C	0.4	0.9	0.1	0.1	98.5	0.0	3,362
Concordia U	0.7	0.9	3.8	0.3	90.4	3.8	1,758
Edgewood C	0.1	2.3	1.6	1.0	95.0	0.0	1,393
Fox Valley Tech C	0.5	0.7	0.5	0.5	97.4	0.4	3,909
Gateway Tech C	0.4	0.8	11.3	8.4	79.1	0.0	9,306
Lakeland C	0.3	1.0	4.5	1.3	92.4	0.5	1,994
Lakeshore Tech C	0.1	1.6	0.4	0.5	97.4	0.0	2,749
Lawrence U	0.2	1.7	2.6	1.1	87.7	6.7	1,237
Madison Area Tech C	0.5	1.2	2.4	1.3	94.6	0.1	12,410
Madison Business C	0.4	0.4	1.1	0.0	94.9	3.3	272
Maranatha Baptist Bible C	0.0	0.7	2.0	1.8	94.5	1.1	457
Marian C of Fond Du Lac	0.4	1.9	2.5	1.0	94.1	0.1	1,669
Marquette U	0.4	3.7	3.1	3.2	85.7	4.0	11,729
Medical C of Wisconsin	0.2	12.2	1.6	2.6	79.7	3.7	1,005
Mid-State Tech C	0.7	0.6	0.1	0.3	98.4	0.0	2,406
Milwaukee Area Tech C	0.9%	2.0%	18.0%	3.1%	75.9%	0.1%	21,600
Milwaukee Inst of Art and Design	0.6	1.7	3.5	3.9	89.4	0.9	462
Milwaukee Sch of Engineering	0.2	2.1	2.5	1.4	92.6	1.2	3,160
Moraine Park Tech C	0.5	0.9	0.3	0.5	97.8	0.0	5,553
Mount Mary C	0.2	1.0	3.7	1.4	92.2	1.1	1,451
Mount Senario C	9.5	4.0	3.4	1.1	80.1	1.9	1,059
Nicolet Area Tech C	7.4	0.7	0.1	0.5	91.3	0.0	1,342
Northcentral Tech C	1.5	5.1	0.0	0.1	92.1	1.2	4,553
Northeast Wisconsin Tech C	2.0	1.1	0.1	0.4	96.4	0.0	6,429
Northland C	6.0	1.3	0.8	1.9	88.2	1.9	756
Northwestern C	0.0	0.0	0.0	0.0	99.0	1.0	206
Ripon C	0.5	1.4	0.8	1.4	92.3	3.6	854
Sacred Heart Sch of Theology	0.0	0.6	0.6	2.8	90.5	5.6	179
Saint Norbert C	1.2	0.6	0.2	0.1	97.2	0.6	1,875
Silver Lake C	0.5	0.7	0.1	1.0	97.5	0.2	830
Southwest Wisconsin Tech C	0.7	1.3	5.6	1.9	90.4	0.2	1,701
Stratton C	0.2	0.3	1.0	0.2	95.7	2.6	580
U of Wisconsin							
Madison	0.5	3.0	1.8	1.6	85.4	7.7	43,209
Eau Claire	0.4	0.8	0.5	0.4	96.3	1.5	10,941
Green Bay	2.5	0.8	0.9	0.6	93.9	1.3	5,137
La Crosse	0.4	0.8	0.9	0.5	96.5	0.9	9,118
Milwaukee	0.7	2.0	6.2	2.3	86.2	2.6	26,020
Oshkosh	0.6	1.2	1.2	0.6	95.7	0.7	11,740
Parkside	0.3	1.1	3.8	2.6	91.4	0.7	5,308
Platteville	0.4	1.2	0.8	0.4	96.2	1.2	5,465
River Falls	0.4	1.0	1.2	0.6	95.5	1.3	5,196
Stevens Point	1.0	0.6	0.5	0.5	94.9	1.4	9,433
Stout	0.5	1.9	0.8	0.5	94.7	1.7	7,629
Superior	1.7	0.9	0.8	0.4	95.1	1.2	2,675
Whitewater	0.2	0.9	3.0	1.2	93.3	1.4	10,820
Ctrs	0.4	0.8	1.1	0.8	96.0	0.8	11,654
Viterbo C	0.4	1.2	0.7	0.4	96.2	1.1	1,218
Waukesha County Tech C	0.3	0.4	0.3	1.6	97.4	0.0	4,975
Western Wisconsin Tech C	0.2	1.0	0.2	0.1	98.4	0.0	3,474
Wisconsin Indianhead Tech C	2.2	0.4	0.2	0.6	96.6	0.0	3,200
Wisconsin Lutheran C	0.0	0.0	3.2	0.4	95.8	0.7	283
Wisconsin Sch of Electronics	1.0	0.0	1.7	1.0	94.6	1.7	298
WYOMING							
Casper C	0.5%	0.2%	0.6%	0.9%	97.3%	0.5%	4,023
Central Wyoming C	12.8	0.8	0.9	2.7	81.3	1.5	1,457
Eastern Wyoming C	0.7	0.3	0.5	4.6	93.7	0.2	1,353
Laramie County CC	0.6	0.8	2.1	4.6	91.8	0.0	4,362
Northern Wyoming CC Dist	1.2	0.3	0.3	1.9	95.8	0.4	2,418
Northwest C	0.8	0.2	0.2	2.0	95.7	1.0	2,001
Phillips C Tech Inst	1.7	0.6	1.3	3.0	92.9	0.6	703
U of Wyoming	1.1	0.7	0.8	2.7	90.9	3.7	12,517
Western Wyoming CC	0.4	0.9	0.9	4.6	92.8	0.4	2,492

Colleges Report Increases in Applications, Despite Fewer High-School Graduates

Continued From Page A34

year, after reports of faculty layoffs and tight class schedules. Officials at the University of Massachusetts at Amherst say their applications dropped for the third year in a row. Applications to the university dropped 9 per cent to 12,000 for the fall. Amherst has been hard hit by budget cuts in recent years.

On the other hand, high-school counselors report that their students are sending more applications to some public institutions because the students believe they can get a good education for less money than at private colleges.

Applications to Ohio University have increased almost 11 per cent over last year. Kip Howard, director of admissions at the university, says increased standards and relatively low tuition have made the university more attractive to students. Applications to Rutgers University also increased by 3 per cent this year. And the University of Tennessee at Knoxville received 12 per cent more applications this year than last.

More Early Decisions

In an effort to have some control over their freshman classes, colleges and universities have accepted more students who applied for so-called early decisions. Under the early-decision process, students apply to their first-choice college by December and agree that, if they are accepted, they will not pursue admission to other institutions.

"More kids are applying early decision because they feel they will get in," says James Williams, dean of admissions at Antioch College. Mr. Williams says that accepting more students earlier insures that colleges will not be scrambling this summer.

Ms. Bates and other admissions officials say some colleges will rely more on financial-aid waiting lists this year.

The financial-aid list will be similar to an admissions waiting list, except that students will be admitted but told that the institution does not have enough financial aid to help them pay their bills. If a student who already has been accepted decides not to attend the institution, the college will offer any money it had committed to that student to those on the waiting list.

'Paying for Kids They Want'

"Colleges are paying for the kids they want, and letting the others hang," says Mr. Williams. "Colleges are saying to kids, We don't have the money now, but we may have the money down the road, so hang in there."

He adds: "We're sending a very disturbing message to kids."

Students and parents fear that with the crunch in financial-aid budgets, colleges will admit students based on their ability to pay. "Parents have told me they are fearful that applying for financial aid will make the admissions offices turn their kids down," says Anne Ferguson, director of college counseling at the Hathaway Brown School in Shaker Heights, Ohio.

Many institutions say they cannot provide figures on the number of applications they received from minority students. However, a few reported increases in the number of black and Hispanic applicants.

The University of Chicago received 543 applications from black high-school seniors, 17 per cent more than last year. It also received 351 applications from Hispanic students, a 24-per-cent increase. The Johns Hopkins University reported that it had received 440 applications from black students, a 43-per-cent increase from the previous year. It also received 35 per cent more applications from Hispanic students—a total of 366.

Reports From the Campuses

Other reports on applications:

- Drew University, up 11 per cent.
- Howard University, up 12 per cent.
- The Johns Hopkins University, up 20 per cent.
- North Carolina A&T University, up 21 per cent.
- Pepperdine University, up 11 per cent.
- The University of Arizona, down 1 per cent.
- The University of Chicago, up 10 per cent.
- The University of Maryland at College Park, up 3 per cent.
- The University of Pennsylvania, up 27 per cent.
- The University of Virginia, down 5 per cent, primarily because fewer out-of-state students applied. ■