Determinants of student demand at Florida Southern College

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ABSTRACT

Determining the factors impacting student demand for higher education at Florida Southern College enables calculation of the effect that tuition levels and other variables have on enrollment and revenue. A times series study utilizing data on published tuition, net tuition and fees, and other potential explanatory factors is conducted to determine their impact on both freshman and total enrollment levels at Florida Southern. Separate analyses of students hailing from Florida and from out-of-state are conducted to determine if there are significant differences in the factors impacting the decisions by these groups to enroll at Florida Southern. In addition, estimates of price elasticities of demand are calculated based on the available data.

This study finds that price-adjusted net tuition (including fees) is a statistically significant determinant of freshman enrollment, as is real per capita income, the annual number of high school graduates, and the US unemployment rate. The net tuition elasticity of demand among Florida freshman students is -1.8, while net tuition is statistically insignificant as a determinant of enrollment by non-Florida freshman students. The study also finds that the price elasticity of demand for the aggregate freshman student population has increased over time as net tuition has risen in real terms. When tuition +fees and financial aid are entered as separate variables (as opposed to being combined as net tuition) into the regressions, the explanatory value of the regression equations increase.

Keywords: Net tuition, price elasticity, price discrimination.

INTRODUCTION

There have been numerous studies conducted on the demand for higher education. These studies have sought to specify the factors that determine enrollment in both private and public institutions. Jackson and Weathersby (1975) defined their independent variables impacting student demand as: the cost of attending the institution, the cost of attending nearby colleges, unemployment, wage levels, median family income, and the number of high school graduates. In a separate study, Toutkoushian et al (2010) analyzed variables such as whether students were in-state residents or out-of-state residents. Both studies used institution pricing as the basis for changes in demand.

A number of studies, including one conducted by Bryan and Whipple, (1995) gathered data through random student sampling in the form of a survey. Others have used aggregate enrollment data from US colleges and universities. While surveys allow for more specific variables to be analyzed, aggregate data provide a broader explanation of movements in demand based on fewer, more generalized variables. An example of the use of aggregate data is a study by Campbell and Seigel (1967) on the effects of income and price on student demand.

While some studies such as Campbell and Seigel conclude that student demand is inversely related to price and directly correlated with income, other studies have shown results that are less predictable. For example, Avery and Hoxby (2004) found that students are more apt to attend an institution if it offers named scholarships rather than general grants, even if the amount of the financial aid is the same. This study also concluded that students have a greater demand when financial aid is front-ended as opposed to being evenly distributed over the period of study. Research by Cantona and de Jong (2004) concluded, somewhat unexpectedly, that students are not responsive to tuition at all, but are sensitive to factors such as financial support, the college premium on future labor market earnings, and the alternative wage.

A study of demand functions at selected liberal arts institutions by Buss, Parker, and Rivenburg (2004) produced several interesting results. They concluded that an increase in tuition in conjunction with an equal increase in financial aid would lower quantity demanded. This calls into question the concept that price elasticity of student demand would simply be a function of the net price (tuition minus financial aid). Relating student demand to the average gross tuition at other liberal arts schools yielded a statistically insignificant cross elasticity measure.

Two previous studies have been conducted of Florida Southern College's price elasticity of demand. The first study (1999) concluded that overall student demand was inelastic, and that net tuition should be increased in order to optimize revenues. It also noted that by raising net tuition and lowering enrollment, institution variable costs would go down.

The second study in 2005 separated Florida Southern College (FSC) students into two groups: Florida freshmen and non-Florida freshmen. It concluded that Florida freshmen had a slightly elastic demand, and that the tuition charged to this group was near the revenue-maximizing level. For the non-Florida freshman group, the study concluded that students had a moderately inelastic demand. It is noteworthy that the second study focused exclusively on freshman enrollment, and that the college increased net tuition charges significantly in the interim period between the two studies.

METHODOLOGY

The primary purpose of the current study is to determine the factors influencing enrollment demand at Florida Southern College. This includes an estimate of the price elasticity of demand. A series of multiple regression analyses was performed with FSC enrollment as the dependent variable.

There are several ways to approach the measurement of price. Historical data were gathered on FSC tuition, fees, room and board, and the average level of financial aid beginning in the year 1976 from the office of the Vice President of Finance and Administration at the college. The price factors were summed in various ways to determine which combination yielded the highest statistical significance. For example, tuition and fees were combined and analyzed against enrollment, as well as net tuition and fees, stated tuition, and total effective cost (including board), among others.

Non-price factors were also analyzed in this study. These factors included the number of high school graduates nationwide, the number of high school graduates in the state of Florida, real and nominal GDP, income (both disposable and non-disposable), the unemployment rate, and interest rates. A separate factor chosen for analysis was the average cost at four-year private colleges, which could potentially be used to calculate a price cross-elasticity measure.

All of the above factors were run against FSC enrollment, which was divided into groups. Data were gathered on student residencies from the Office of Institutional Research at the college in order to investigate potential differences in elasticity between Florida and non-Florida students. It was also surmised that the study should focus more directly on the freshman population since upperclassmen in the overall college population would encounter additional costs were they to choose to enroll elsewhere.

RESULTS

Regression results for both Florida and non-Florida freshmen and Florida and non-Florida students of all classes found net tuition and fees to be the best correlated price point. When room and board costs were included as a component of price, the R^2 value decreased markedly. When room and board was entered as a separate variable, it was found to be an insignificant determinant.

The regression equation for FSC freshmen students (with t-statistics in parentheses beneath the coefficients) is:

Fresh Enrollment = -845.258 -.049 FSC Net Tuit&Fees +.088 Per Cap Income +
(-3.26) (3.94)

43.581 Unemploy Rate – 0.456 High School Grads
(4.70) (-2.89)

The freshman population of FSC yielded a price (net tuition + fees) elasticity of demand of -1.2 (elastic). The price elasticity for freshman from the state of Florida was higher at -1.8. Coefficient signs were as expected. For non-Florida freshmen, the coefficient (-0.29) was statistically insignificant. (See Table 1 in Appendix)

The regression equation for all FSC students (with t-statistics in parentheses beneath the coefficients) is:

Total Enrollment = -1229.001 -.091 FSC Net Tuit&Fees + 0.168 Per Cap Income +

(-2.80) (3.48)

65.932 Unemploy Rate – 0.715 High School Grads
(3.28) (-2.09)

Regressions using the entire FSC population as the dependent variable show a price elasticity of demand of -0.72 (inelastic). When the aggregate population is divided according to residency, the elasticity for Florida residents is –1.1 (elastic); and for non-Florida residents, price is, again, an insignificant determinant. These results fit with our previously mentioned hypothesis that upperclassmen will have a more inelastic demand than freshmen. The results also indicate that demand by non-Florida residents is less sensitive to price than is the case for Florida students. (See Table 2 in Appendix)

Regression results for the freshman population show per capita income and the US unemployment rate to be significant determinants of enrollment for all groups, including Florida and non-Florida residents. The coefficients are all of the expected sign. The number of high school graduates nationwide is a significant determinant for the freshman group as a whole, and for non-Florida freshmen. High school graduates nationwide are not a significant determinant of FSC enrollment by Florida residents.

The sign of the coefficient for high school graduates is the opposite of what is expected for those groups where it qualifies as a significant factor. Lagging high school graduates by one year to reflect the time lag between graduation and college enrollment failed to reverse the sign. The unexpected sign result is consistent with that reported in the 2005 Florida Southern study. Leaving the number of high school graduates out of the regression equations significantly lowers their explanatory power (R^2).

When tuition +fees and financial aid are entered as separate variables (as opposed to being combined as net tuition) into the regressions, the explanatory value of the equation increases. (See Table 3 in Appendix) The effect is strongest among the non-Florida freshmen where the adjusted R^2 rises from .61 to .80. The results suggest that the absolute values of tuition and financial aid may have some effect beyond their combined (net) value. That is consistent with results of the previously mentioned study by Buss, Parker, and Rivenburg. However, in the current study gross tuition and fees is not a statistically significant determinant of non-Florida freshman enrollment, while financial aid is a statistically significant determinant.

The enrollment elasticity with respect to changes in stated financial aid is +1.29 among all freshmen. It is +1.35 for Florida freshmen, and +1.21 for non-Florida freshmen. The coefficients are of the expected signs, and the "t" values are significant for all groups.

Variables tested that failed to add significantly to the explanatory power include room and board charges, interest rates, the real minimum wage, total US employment, the Polk County unemployment rate, real and nominal GDP, Florida high school graduates, and the average net tuition for four-year private universities and colleges. The insignificance of the latter variable prohibited the calculation of a meaningful price cross-elasticity measure, as was the case in the study by Buss, Parker, and Rivenburg.

CONCLUSIONS

This study yielded several interesting results. First is the insignificance of net tuition and fees as a determinant of demand by non-Florida residents. This strongly suggests that non-Florida students are less sensitive to changes in net tuition, and that some degree of price

discrimination could be employed in order to raise revenues.

Revenue maximization is certainly not the primary goal of a private college. However, strategies to increase revenue may be helpful in pursuing other goals. Net tuition and fees is the price measure with the strongest relationship to enrollment. When room and board is added to the regression (to represent a total net cost figure) the adjusted R^2 value is unexpectedly reduced. These findings suggest that students are not significantly responsive to room and board charges. A possible explanation for this outcome is that students assume that room and board costs are consistent among all schools.

The results also show that the level of real per capita income is a statistically significant determinant in a student's decision to enroll, and that it is a more important consideration for Florida students than for non-Florida students.

This study finds that the overall FSC price elasticity of demand has become more elastic over time. That is expected with the significant increases in net tuition in recent years (an increase of 73% from 1999 to 2010). Concurrently, the college has enjoyed increasing enrollment, which can be partially explained by the success of the college in redirecting recruitment efforts toward out-of-state candidates with a lower price elasticity of demand. The college may find it fruitful to differentiate its net pricing between Florida and out-of-state residents.

A finding that warrants future research is that students respond not only to tuition and financial aid taken together (net tuition), but to the absolute values of those factors separately as well. Buss, Parker and Rivenburg concluded in their study that a matching increase in tuition and financial aid would lower the quantity demanded, implying that a dollar increase in tuition would have a larger negative impact on enrollment than a dollar increase in financial aid. The current study indicates that may not be true among the non-Florida freshman students.

Therefore, it may be possible for FSC to raise both tuition and the financial aid offered non-Florida students, leaving net tuition constant and yet increasing student demand (shifting the demand function relating quantity demanded to net tuition to the right). A possible explanation lies in student perceptions. When tuition is increased, students may believe that the education that the college offers is of a higher quality. Similarly, when financial aid is increased, students may perceive that the net price offer has a higher value. These possibilities invite further investigation.

APPENDIX

TABLE 1

Freshman Population	**Total**	**Florida**	**Non-Florida**
Adjusted R^2	0.63	0.45	0.61
Net Tuition Price Elasticity	-1.2	-1.8	-0.29 Insignificant
Variable Coefficient (t Stat)			
Net Price	-.049 (-3.26)	-.044 (-3.57)	-.005 (-0.51)
Per Capita Disposable Income	.088 (3.94)	.057 (3.09)	.031 (2.17)
Unemployment Rate (US)	43.581 (4.70)	22.079 (2.89)	21.502 (3.62)
High School Graduates (US)	-0.456 (-2.89)	-0.166 (-1.28)	-0.290 (-2.86)

Data on Per Capita Disposable Income from Bureau of Economic Analysis
Data on US Unemployment Rates from the US Bureau of Labor Statistics
Data on US High School Graduates from 2011 Statistical Abstract of the US

TABLE 2

Aggregate Population	**Total**	**Florida**	**Non-Florida**
Adjusted R^2	0.62	0.61	0.34
Net Tuition Price Elasticity	-0.72	-1.1	+.12 Insignificant
Variable Coefficient (t Stat)			
Net Price	-0.091 (-2.80)	-0.095 (-3.44)	.005 (0.23)
Per Capita Disposable Income	0.168 (3.48)	0.133 (3.24)	.022 (0.60)
Unemployment Rate (US)	65.932 (3.28)	41.908 (2.46)	24.012 (1.61)
High School Graduates (US)	-0.715 (-2.09)	-0.315 (-1.08)	-0.196 (-0.77)

Data on Per Capita Disposable Income from Bureau of Economic Analysis
Data on US Unemployment Rates from the US Bureau of Labor Statistics

Data on US High School Graduates from 2011 Statistical Abstract of the US

TABLE 3

Freshman Population	**Total**	**Florida**	**Non-Florida**
Adjusted R^2	0.67	0.50	0.80
Tuition Price Elasticity	-2.3	-4.2	+.28 Insignificant
Financial Aid Elasticity	1.29	1.35	1.21
Variable Coefficient (t Stat)			
Tuition	-0.056 (-3.17)	-0.059 (-4.00)	.003 (0.33)
Financial Aid	.080 (3.49)	.048 (2.53)	.032 (2.80)
Per Capita Disposable Income	0.094 (3.44)	0.081 (3.58)	.012 (0.93)
Unemployment Rate (US)	33.95 (3.93)	20.10 (2.79)	13.85 (3.25)
High School Graduates (US)	-0.694 (-3.93)	-0.306 (-2.08)	-0.388 (-4.46)

Data on Per Capita Disposable Income from Bureau of Economic Analysis
Data on US Unemployment Rates from the US Bureau of Labor Statistics
Data on US High School Graduates from 2011 Statistical Abstract of the US

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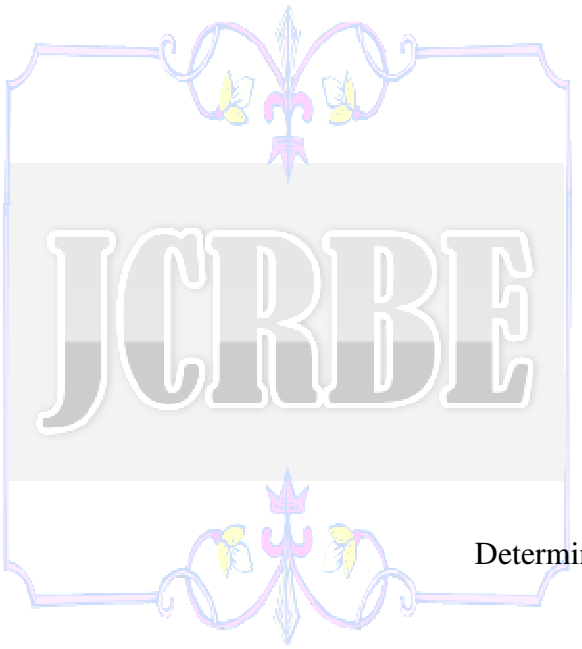
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