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This chapter demonstrates how institutional researchers at institutions of higher education can use economic theory for enrollment management.

Using Economic Concepts to Inform Enrollment Management

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In its simplest and earliest form, enrollment management was the gatekeeping function of an institution, overseen largely by the admissions office (Hossler, 1996). For much of its history, enrollment management has been focused on admitting the appropriate number of students and offering them sufficient amounts of financial aid so that an institution's first choice of students will enroll as freshmen (Coomes, 2000). In its current state, enrollment management focuses on many things besides recruitment and the packaging of financial aid. The scope of enrollment management includes trying to increase the pool of prospective students, attracting applicants, optimizing financial aid packages, establishing effective student services, and trying to maximize the chances that students will successfully complete their academic careers (Hossler, 2000).

The support that institutional researchers provide to the enrollment management functions of their institutions is highly valuable. As institutions of higher education (IHEs) compete for financial resources, administrators are relying more heavily on institutional researchers to explain and predict why students decide to apply to, enroll, and continue to graduation in an institution. Institutional researchers are also key support personnel in determining how institutions can allocate their resources more efficiently and effectively, and much of this type of work has an enrollment management aspect.

We believe enrollment management efforts can be informed by economic concepts, and in this chapter we provide information about foundational

economic concepts that can be used to assist enrollment management decision making. Where appropriate, we provide examples or citations to research that may help institutional researchers use an economic lens from which to view enrollment management issues. (For a more general treatment of the economics of higher education, see Becker and Lewis, 1982.)

Underlying much of microeconomic theory is the idea that individuals are actors in a variety of markets and make decisions that will maximize their well-being. Much of economic theory is based on how individuals act in consumer markets, but this idea of individualism may also hold true for many other decisions that people make, including how much to invest in their own education. Regarding the latter, economists use the theory of human capital to explain how individuals make decisions regarding the amount of education to acquire. Human capital can be thought of as the collective skills and attributes that enable individuals to become more productive in the workplace, thereby leading to higher salaries, and this connection is often referred to by economists as an “investment in human capital” (see Becker, 1964, for details).

Human capital theory is important for enrollment management because it can provide a conceptual basis for student and institutional decision making. Students identify the different educational choices that are feasible for them, and they weigh the benefits (higher future incomes, nonpecuniary factors) and costs (forgone earnings, tuition and fees) of these alternatives (see DesJardins and Toutkoushian, 2005, for additional details). This framework has been the conceptual basis for many studies of student behavior, including the student choice and student demand literature (Jackson and Weathersby, 1975; Kohn, Manski, and Mundel, 1976; Chapman, 1979; Venti and Wise, 1982; Weiler, 1984, 1987; Hossler, Braxton, and Coopersmith, 1989; Paulsen, 1990; Kane, 1994; DesJardins, Dundar, and Hendel, 1999; Hossler, Schmit, and Vesper, 1999; St. John, Asker, and Hu, 2001; Toutkoushian, 2001; DesJardins, Ahlburg, and McCall, 2006).

Embedded in human capital theory is the notion that individuals are rational actors and attempt to maximize their well-being, or “utility.” Many economic models posit that individuals make many decisions, including college attendance decisions, based on the utility derived from different schooling options, and not simply based on the net financial benefits. The utility framework takes into account not only the perceived financial net benefits, but also nonpecuniary benefits and costs of each choice and the satisfaction students derive from these choices. Although a student’s utility is strictly unobservable, we can infer utility maximization by observing students’ choices and statistically model observed actions as a proxy. This framework provides the theoretical basis for probability models estimating student choice on whether to go to college, where to apply, and, conditional on admission, whether to enroll (see DesJardins, Ahlburg, and McCall, 2006, for an example). An important factor that enters into the utility calculations of individuals is the return they can expect from investing in a college edu-

cation. While both private and social rates of return are important when it comes to considering education, here we focus on the individual or private rates only. A traditional economic perspective predicts that the decision to invest in higher education is influenced by expected costs and benefits, financial resources, academic ability, perceived labor market opportunities, personal preferences and tastes, and uncertainty (Becker, 1964).

The utility maximization framework can also be applied to other decision-making units, such as IHEs. For instance, the decisions institutions make about admitting students parallels the individual decision-making structure discussed above. Institutions often base admission on the ACT or SAT tests and high school performance of students. This strategy is often designed to enroll a class that will generate sufficient tuition revenues, achieve a level of diversity in keeping with the IHE's mission, and attract students whose academic potential is congruent with faculty expectations. Thus, like individual students, institutions also have utility functions comprising varying objectives depending on the mission and goals of the institution.

Economics can help us better understand the behavior of individuals and IHEs alike, but it is the aggregation of these actors and their actions that comprises the educational market. In order to successfully apply economic concepts to enrollment management issues, it is also important to have an understanding of the foundational market concepts of supply and demand.

Demand refers to the quantity of a good that consumers are willing and able to buy at a given price, whereas *supply* depicts the relationship between the quantity of a good that producers are willing and able to supply at a given price. In the realm of enrollment management, the good supplied is the education offered by IHEs, the consumers are students and their families, the producers are the institutions, and the price is the tuition charged in a given semester or academic year. One of the main functions of enrollment managers is to craft a class that is large enough to generate revenues sufficient to operate the educational enterprise. However, attracting students is difficult, as they have many higher education options. Whether students apply to a college, where they eventually decide to matriculate, and whether IHEs have the capacity or desire to admit these students is a function of many of the factors that influence the demand and supply of other consumer products. The factors that influence how much consumers (such as students and their families) are willing and able to purchase (in other words, the quantity demanded or Q_{xD} in equation 4.1 below) are the price of the good in question (tuition, or P_x); the income levels of students and their families, represented by Y ; the prices of complementary (such as room and board, books) and substitute goods and services (such as tuition levels at other IHEs), represented by P_c and P_s ; the expected price of the good in future periods ($P_{x,t+1}^e$); and the tastes and preferences of consumers, represented by TP (Hirshleifer, 1980; Maurice and Smithson, 1985). This relationship can be represented by

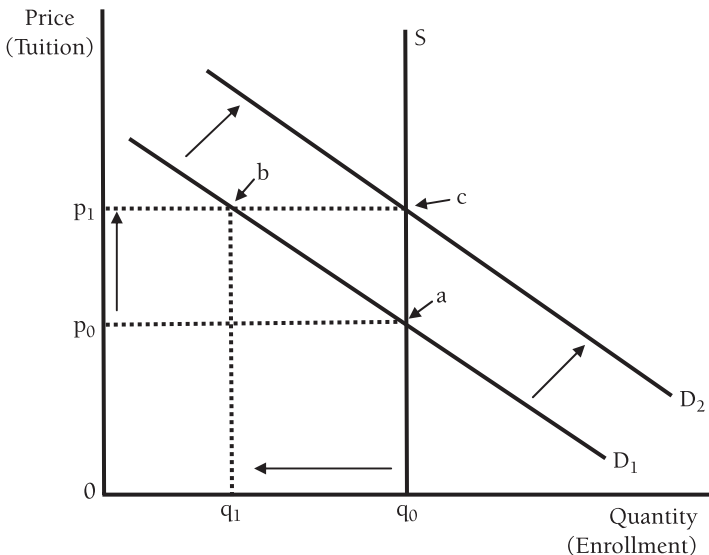
$$Q_{xD} = f(P_x, Y, P_c, P_s, P_{x,t+1}^e, TP). \tag{4.1}$$

Knowing the determinants of demand can help institutional researchers identify important elements that might affect how students make college choice and continuation decisions. For a formal treatment of the demand for higher education, see Becker (1990), and for one that includes issues of enrollment forecasting, see Hoenack and Weiler (1979).

The quantity demanded for a particular good (including college attendance) is affected by each of the terms on the right-hand side of equation 4.1. The first law of demand indicates that as the price of a good increases (decreases), the quantity demanded will fall (rise), *ceteris paribus* (other things held constant). Given the negative relationship between price and quantity demanded, the typical demand curve is downward sloping (see Figure 4.1), reflecting that prices must be reduced in order to increase quantity demanded.

An important distinction to make is the difference between price-induced changes in quantity demanded versus changes or shifts in demand that occur because of changes in the nonprice determinants of demand. Price-induced changes in quantity demanded result in movements along the demand curve (see Figure 4.1). If enrollment demand at your IHE is represented by D_1 and the tuition (price) increases from p_0 to p_1 , enrollments (quantity demanded) will decline from q_0 to q_1 . The price-induced change is indicated by the movement from the price/quantity pair at point a to a

Figure 4.1. Changes in Quantity Demanded Versus Changes or Shifts in Demand



new price/quantity combination at b. A common mistake is to describe this as a change in demand, but changes in demand are due to changes in one or more of the nonprice factors included in equation 4.1. For instance, *ceteris paribus*, if incomes rise among our prospective students, we might expect the enrollment demand for our IHE to increase, as depicted in Figure 4.1 by an income-induced shift in demand from D_1 to D_2 . And if incomes decline, the reverse would be the case.

The example provided in Figure 4.1 demonstrates how an observed increase in price could be due to movement along a fixed demand curve (from point a to point b) or a change or shift in demand (from D_1 to D_2) that results in a new equilibrium price at point c. This example assumes that income changes induce a shift in demand, but other nonprice factors in equation 4.1 can also cause changes or shifts in demand. (For information about how changes in these additional determinants of demand affect the position of the demand curve, see Hirshleifer, 1980, or any microeconomics text.)

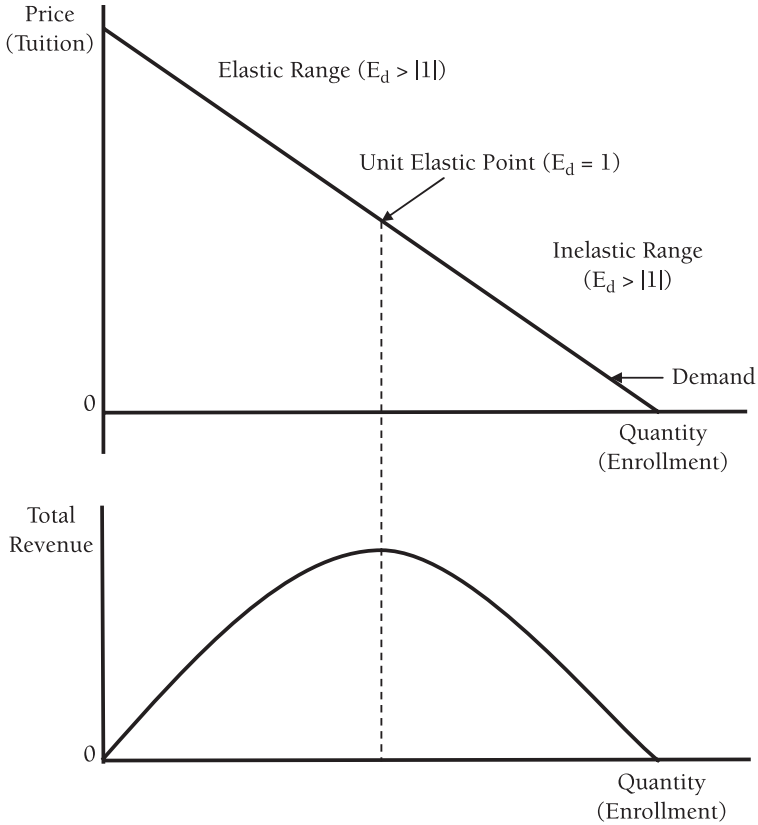
Elasticity

How sensitive quantity demanded is to changes in price is measured by a ratio known as the price elasticity of demand. This ratio,

$$E_p = \frac{\% \Delta Q_x}{\% \Delta P_x} < 0, \quad (4.2)$$

indicates how the percentage change (denoted by $\% \Delta$) in the quantity demanded will change given a percentage change in the price of X. Those with a calculus background will note that the relationship presented in equation 4.2 could also be represented in derivative form by $\partial Q_x / \partial P_x < 0$ where ∂ indicates the partial effect. This ratio can help us understand the magnitude of changes in enrollment when tuition (price) changes. The ratio of proportionate changes is used to avoid the difficulty that different units of measurement in the numerator and denominator may induce, and having a quantity that is not affected by the units of measurement also facilitates elasticity comparisons for different groups of students (in-state versus nonresidents), by institutional type (four-year versus two-year institutions), or differences over time.

Elasticities greater than one (in absolute value) indicate that the percentage change in quantity demanded is greater than the percentage change in price. If the absolute value of the price elasticity is less than one, then the percentage change in quantity demanded is less than the percentage change in price. When demand is linear, the midpoint of the function is where the percentage change in quantity demanded is equal to the percentage change in price (unitary elasticity of demand; see Figure 4.2). Between the unitary point and the price (quantity) axis is the elastic (inelastic) region. Price, quantity, and total revenue relationships are different in the elastic and inelastic portions of the demand curve. Figure 4.2 can also be used to visualize the

Figure 4.2. Elasticity and Revenue Relationships

direction of total revenue changes when prices rise or fall in the elastic and inelastic regions of the demand curve (more on total revenue below).

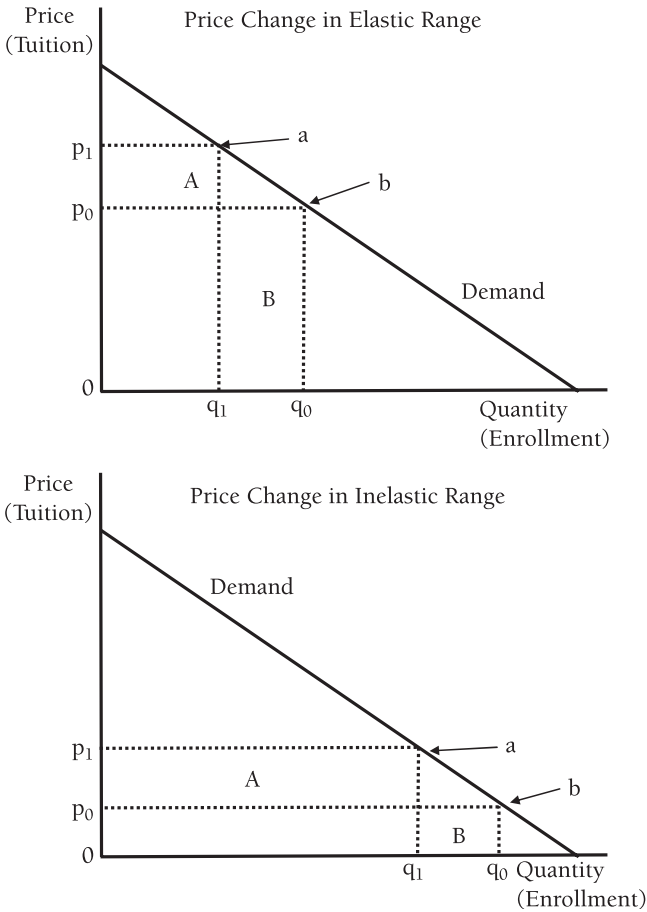
For example, suppose you determine that your institution's price (tuition) elasticity of demand (enrollment) is -0.55 (inelastic). You verify this estimate is reasonable by examining the literature on tuition responsiveness (Leslie and Brinkman, 1987; Heller, 1997). Assume your IHE wants to raise tuition by 10 percent and wants you to provide an estimate of the effect that this change will have on enrollments. This is easy to determine by applying equation 4.2:

$$-0.55 = \frac{\% \Delta Q_x}{10\%}$$

Rearranging terms:

$$\begin{aligned} \% \Delta Q &= -0.55 * 10\% \\ \% \Delta Q &= -5.5\% \end{aligned}$$

Figure 4.3. Total Revenue Changes Given Price Changes in Elastic and Inelastic Ranges



You inform the provost that a 10 percent increase in tuition (price) is likely to result in a reduction in enrollments (quantity demanded) of about 5.5 percent (*ceteris paribus*). Knowledge of tuition elasticity is also crucial to understanding how total revenue (price times quantity) is affected by tuition changes. Figure 4.3 (top panel) displays what happens to total revenue when the price (tuition) rises from p_0 to p_1 in the elastic portion of the demand curve. When price is p_0 , total revenue is bounded by $0p_0bq_0$ and when the price rises to p_1 , total revenue is equal to the rectangle bounded by $0p_1aq_1$. The price rise increases total revenues by the rectangle represented by A; however, the price increase also induces a reduction in the

quantity demanded, resulting in a total revenue decline of B (because quantity demanded declined from q_0 to q_1). Because $A < B$, the net total revenue declines due to the price rise. The general relationship is that price changes and total revenue are inversely related when operating in the elastic portion of the demand curve. The converse is true when operating in the inelastic range of the demand curve (see the bottom panel). On balance, $A > B$ implying that total revenue increases due to the price increase.

Elasticity measures are also available for the other determinants of demand, and an important one for enrollment managers to understand is the income elasticity of demand. This ratio measures the relative responsiveness of quantity demanded to changes in income, holding other things in the demand equation constant. This relationship can be represented by

$$E_Y = \frac{\% \Delta Q_X}{\% \Delta Y} \quad (4.3)$$

where E_Y is the income elasticity of demand, Y is a measure of income, and the numerator is quantity demanded. A positive sign on E_Y indicates a “normal” good, meaning that increases (decreases) in income result in increases (decreases) in quantity demanded. A negative sign indicates an “inferior” good, meaning that increases (decreases) in income result in decreases (increases) in quantity demanded.

Enrollments in higher education are typically thought of as a normal good, and estimates of income elasticity are typically slightly inelastic (slightly greater than 1.0), meaning that for each 1 percent increase (decrease) in income, enrollments increase (decrease) by about 1 percent.

If an increase in the price of one good induces an increase in the quantity demanded of another good, these goods are said to be *substitutes*. Examples of substitutes are using part-time faculty rather than full-time faculty or individuals attending college rather than entering the labor force. Goods are *complements* if an increase in the price of either will cause a decrease in the quantity demanded of both goods. A measure used to judge whether goods are substitutes or complements is the cross-price elasticity of demand. It measures the relative responsiveness of the quantity demanded for good X when the price of good Y changes (*ceteris paribus*), and is represented by

$$E_{XY} = \frac{\% \Delta Q_X}{\% \Delta P_Y} \quad (4.4)$$

where the numerator is the quantity demanded of good X (such as part-time faculty) and P_Y is the price of good Y (salaries of full-time faculty). The sign of the cross-price elasticity is positive (negative) when X and Y are substitutes (complements). Heller (1999) found positive cross-price responses between four-year comprehensive IHEs and community colleges, indicating they are substitutes. Thus, when the former increase tuition, enrollments increase in the latter. As an example of a nonprice cross-elasticity, if the Uni-

versity of Illinois increases its admissions standards, it may induce increased enrollments at competing institutions such as the University of Iowa or Indiana University.

Consumers' tastes and preferences also affect the demand for goods and services, but the direction of their effects is not determinable a priori. IHEs spend considerable resources to shape prospective students' tastes and preferences, and this is done by enrollment managers within the institution or by hiring enrollment management consultants and marketing firms. These efforts often entail direct mail marketing and telemarketing campaigns (see DesJardins, 2002, for details on using inferential analysis to enhance institutional marketing efforts), policies to encourage campus visits, and advertising campaigns. One objective of these efforts is to change students' propensities of application and enrollment.

Supply-Side Considerations

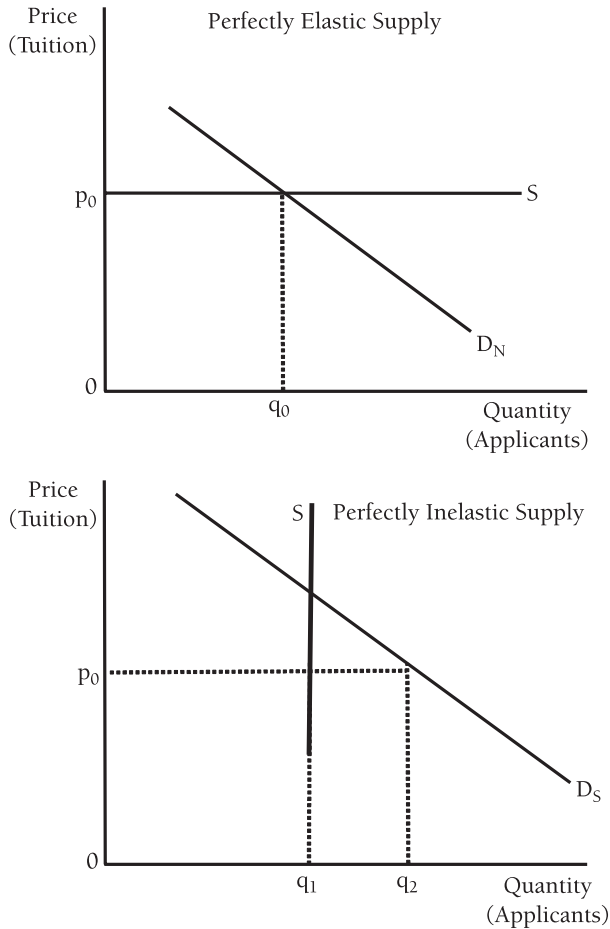
The amount producers are willing to supply is related to the price they can garner for the good, plus a number of other factors (Maurice and Smithson, 1985). Besides price (P_x), the other factors that affect the amount supplied in a given time period are the state of technology (for example, innovations in teaching delivery such as distance education, represented by T), the price (P_x) and changes in price of inputs (F ; labor costs, the largest in higher education, land, and capital), the price of substitute and complementary goods, and expectations about future prices of the good ($P_{x, t+1}^e$) (Maurice and Smithson, 1985). The factors affecting supply can be represented by

$$Q_{xS} = f(P_x, F, P_c, P_s, P_{x, t+1}^e, T). \tag{4.5}$$

The slope of the typical supply curve is positive, indicating that firms must be induced by higher prices to produce additional goods and services. Thus, price elasticity of supply is positive and can be used to measure how sensitive supply is to changes in price. There are, of course, nonprice supply elasticities that parallel the demand side elasticities. We leave it up to the reader to investigate these in any microeconomics textbook.

$$E_S = \frac{\% \Delta Q_x}{\% \Delta P_x} > 0. \tag{4.6}$$

The typical microeconomic model in which supply and demand interact to clear the market and determine equilibrium price may not hold for the higher education industry, especially on the supply side. For instance, many IHEs are unwilling or unable (at least in the short run) to supply seats to students even if the students are willing to pay increasingly higher prices. Thus, the elasticity of the supply function may be very different depending on the IHE's degree of selectivity. Clotfelter (1991) notes that differences in

Figure 4.4. Application Supply in Open Admissions Versus Selective Institutions

application policies at two hypothetical IHEs can be analyzed using standard economic theory, even when the market clearing treatment does not apply (see Figure 4.4).

For the sake of expository simplicity, assume tuition (price) is constant (p_0) at two institutions: one that is open admissions and the other that is selective in admissions. The nonselective IHE's situation is represented by the graph on the top, where demand for admission is D_N and the number of applicants accepted is determined by the intersection of the demand and horizontal (perfectly elastic) supply curve.

The number of applicants at the prevailing tuition is q_0 . Under this admissions policy, the institution will accept all students, so enrollment is

determined by demand for seats at this IHE. In contrast, the selective institution constrains supply at q_1 , as represented by the perfectly inelastic (vertical) supply curve. At the prevailing tuition level, q_2 , applicants are seeking admission; thus, there is excess demand in the amount of $q_2 - q_1$. This demonstrates how it is possible for the supply of places at an institution to determine enrollment levels.

Supply-side considerations also have implications for how enrollments are estimated. For instance, Weiler (1987) notes that studies of enrollment demand “typically assume that public institutions accept all eligible applicants,” but “if enrollments are limited by institutional constraints on the supply of places, another approach to estimating student demand behavior is needed” (p. 51). Weiler demonstrates how to conduct such analyses under different assumptions about the supply side. These examples demonstrate how important a sound understanding of the supply side of an IHE is for enrollment management research and practice.

Price Discrimination

Price discrimination is the practice of charging different prices to different consumers for the same good or charging consumers different prices based on the quantity purchased. Perfect price discrimination is charging individual consumers an amount equal to their willingness to pay. Second-degree price discrimination is when the price per unit depends on the amount of the good bought. Third-degree price discrimination is the practice of dividing the relevant market into groups (segments) based on their price elasticities and charging each of these segments different prices for the same good. Due to limitations in determining each individual's price elasticity, engaging in first-degree price discrimination is often very difficult, and second-degree pricing does not make much sense for IHEs. However, institutions often engage in third-degree price discrimination by segmenting their market and then charging different tuition for these segments (such as residents versus nonresidents, graduate versus undergraduate students, and upper- versus lower-division students). Institutions try to discern the tuition responsiveness of students using information from the testing agencies (ACT and SAT) and from the Free Application for Student Assistance (see DesJardins, 1999, 2002, or Toutkoushian, 2001, for examples).

In one of the earliest studies of differential pricing, Berg and Hoenack (1987) examined the feasibility and effects of charging upper-division students higher tuition than their lower-division (freshman and sophomore) counterparts. Their main rationale for differential pricing was that students have different sensitivities to tuition because it is costly for students to transfer to another IHE, these costs typically rise as students become more invested in an institution, and as their academic careers progress, there may be fewer close substitutes. These reasons suggest that upper-division students' tuition elasticities of enrollment are likely to be less sensitive to

tuition increases (more inelastic) than their lower division peers. Also, if upper-division students' tuition elasticity is less than 1, tuition increases targeted toward them will result in increased tuition revenue (*ceteris paribus*).

Another way institutions engage in price discrimination is by practicing tuition discounting, which is providing "institutionally funded grant aid to help defray students' college expenses" with the objective of influencing their enrollment decision (Davis, 2003, p. 3). The ability of institutions to use tuition discounting varies widely by institution type and available resources (such as endowments); however, all institutions subsidize at least a portion of the cost of educating students (Winston, 1999). These subsidies are designed to lower the cost of higher education to students by reducing their net price, defined as the "sticker," or posted, tuition less any institutional grants or scholarships. Tuition discounting has become an increasingly popular way to attract students (Lapovsky and Hubbell, 2003). For example, in the mid-1990s, the University of Iowa experienced continuing declines in enrollments of nonresident students largely because many of its competitors had been discounting to prospective students. Thus, Iowa found itself in a situation where failure to respond to competitive pressures would likely result in continued erosion of nonresident enrollments and the substantial tuition revenue they generated. Administrators decided to offer a new scholarship to selected nonresident students, in effect, discounting the Iowa sticker price to nonresident students. DesJardins (2001a, 2001b) demonstrated how the effects of this policy proposal were estimated and simulated using many of the economic concepts discussed above: not only could this discounting strategy increase enrollments from the targeted group, but net tuition revenue could also be increased.

Subsidies from noninstitutional sources (federal and state government, private sources) also reduce the net price of attendance for students. Many different types of financial aid are provided to students, and the effect of these subsidies on enrollment (Hossler, 2000) and graduation (DesJardins, Ahlburg, and McCall, 2002) has been heavily studied. These subsidies, whether from an IHE's coffers or not, can often remedy some of the differentials in elasticities among prospective students. For instance, research has shown that financial aid offers to low-income students may ameliorate some of the enrollment probability differences relative to their higher-income counterparts (McPherson and Schapiro, 1989; St. John, 1990; Heller, 1997). McPherson and Schapiro (1998) also provide an excellent treatment of how financial aid is used as a competitive weapon and offer an interesting discussion of merit aid from the institutions' and students' perspective.

Finally, institutional researchers can conduct analyses of enrollments using both price and financial aid elasticity concepts. DesJardins (1999) examined the effects of a proposal to increase the tuition of Wisconsin students attending the University of Minnesota. Using information about the tuition and aid elasticities of these students, he created three financial aid need groups and estimated enrollment changes for each segment. Given lim-

ited time to conduct this study, the elasticities for each of these three groups were obtained from the existing literature (St. John, 1990, 1994). A simple spreadsheet was constructed that allowed the analyst to report (in real time) to a group of decision makers the likely enrollment impact of the proposed tuition surcharge. The analysis revealed that enrollments would decline insignificantly, yet net tuition revenue would increase by almost \$200,000. These results confirmed what the author suspected a priori: Wisconsin students' sensitivity to tuition changes was relatively inelastic.

Conclusion

The primary goal of this chapter was to provide institutional researchers with an understanding of simple yet powerful economic concepts that, when properly applied, can inform enrollment management research and institutional decision making. A foundational understanding of supply and demand and how they interact to determine prices is necessary (but not sufficient) if institutional researchers are to understand the educational marketplace in which their institutions operate. Institutional research professionals should also have a firm understanding of related concepts such as elasticity, in particular, price (tuition) elasticity of demand (enrollment), because of its utility in estimating tuition revenue when tuition levels change. Also, as DesJardins (2001a, 2001b) demonstrated, price elasticity concepts can be used to estimate enrollment levels under various tuition (pricing) scenarios using basic inferential methods and common spreadsheet software.

Although there are untold situations where simple economic principles can inform enrollment management efforts, many factors may complicate these applications. Weiler (1987) demonstrated how deviations from classical supply-side assumptions may affect how institutional researchers estimate enrollment levels at their institutions. This is a demonstration of how real-world situations can and do complicate the analysis that institutional researchers conduct and how a solid understanding of economic principles can assist in thinking through such complications. Our suggestion is that if you confront a situation in which you are unsure of how economic theory can be applied, look to the literature. There are many articles and books available in the economics and higher education literature where researchers have used economic theory as the conceptual basis of projects that have institutional research and enrollment management implications. Although they may not map to a specific issue or problem, many times they provide the guidance needed as the foundation for a study. For example, DesJardins' 1999 study of the enrollment and tuition revenue effects of changes to the tuition reciprocity agreement between Minnesota and Wisconsin could not have been completed in time to affect the decision-making process had he not obtained important information on tuition and aid elasticities from an article published in 1994 by St. John.

In conjunction with the other chapters presented in this volume, we hope the conceptual information presented here, and its application to enrollment management issues, has been instructive. It is our sincere hope that our efforts will assist institutional researchers in being even more effective in the conduct of enrollment management research at their institutions of higher education.

References

- Becker, G. *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. Cambridge, Mass.: National Bureau of Economic Research, 1964.
- Becker, W. "The Demand for Higher Education." In S. A. Hoenack and E. L. Collins (eds.), *The Economics of American Universities*. Albany: State University of New York Press, 1990.
- Becker, W., and Lewis, D. *The Economics of American Higher Education*. Norwell, Mass.: Kluwer, 1982.
- Berg, D., and Hoenack, S. "The Concept of Cost-Related Tuition and Its Implementation at the University of Minnesota." *Journal of Higher Education*, 1987, 58(3), 276–305.
- Chapman, R. "Pricing Policy and the College Choice Process." *Research in Higher Education*, 1979, 10, 37–57.
- Clotfelter, C. "Explaining the Demand." In C. T. Clotfelter, R. G. Ehrenberg, M. Getz, and J. J. Siegfried (eds.), *Economic Challenges in Higher Education*. Chicago: University of Chicago Press, 1991.
- Coomes, M. "The Historical Role of Enrollment Management." In M. Coomes, (ed.), *The Role Student Aid Plays in Enrollment Management*. New Directions for Student Services, no. 89. San Francisco: Jossey-Bass, 2000.
- Davis, J. *Unintended Consequences of Tuition Discounting*. Indianapolis: Lumina Foundation for Education, 2003.
- DesJardins, S. "Simulating the Enrollment Effects of Changes in the Tuition Reciprocity Agreement Between Minnesota and Wisconsin." *Research in Higher Education*, 1999, 40(6), 705–716.
- DesJardins, S. "Assessing the Effects of Changing Institutional Aid Policy." *Research in Higher Education*, 2001a, 42(6), 653–678.
- DesJardins, S. "Assessing the Impact of a Change in Institutional Aid Policy: A Simulation Tool." *Journal of Student Financial Aid*, 2001b, 30(3), 7–16.
- DesJardins, S. "An Analytic Strategy to Assist Institutional Recruitment and Marketing Efforts." *Research in Higher Education*, 2002, 43(5), 531–553.
- DesJardins, S., Ahlburg, D., and McCall, B. "Simulating the Longitudinal Effects of Changes in Financial Aid on Student Departure from College." *Journal of Human Resources*, 2002, 37(3), 653–679.
- DesJardins, S., Ahlburg, D., and McCall, B. "An Integrated Model of Application, Admission, Enrollment, and Financial Aid." *Journal of Higher Education*, 2006, 77(3), 381–429.
- DesJardins, S., Dundar, H., and Hendel, D. "Modeling the Application Decision Process at a Land Grant University." *Economics of Education Review*, 1999, 18, 117–132.
- DesJardins, S., and Toutkoushian, R. "Are Students Really Rational? The Development of Rational Thought and Its Application to Student Choice." In J. C. Smart (ed.), *Higher Education: Handbook of Theory and Research*. New York: Springer, 2005.
- Heller, D. "Student Price Response in Higher Education: An Update to Leslie and Brinkman." *Journal of Higher Education*, 1997, 68(6), 624–659.
- Heller, D. "The Effects of Tuition and State Financial Aid on Public College Enrollment." *Review of Higher Education*, 1999, 23(1), 65–89.

- Hirshleifer, J. *Price Theory and Applications*. Upper Saddle River, N.J.: Prentice Hall, 1980.
- Hoenack, S., and Weiler, W. "The Demand for Higher Education and Institutional Enrollment Forecasting." *Economic Inquiry*, 1979, 17(1), 89–113.
- Hossler, D. "From Admission to Enrollment Management." In A. Rentz (ed.), *Student Affairs Practice in Higher Education*. (2nd ed.) Springfield, Ill.: Charles C. Thomas, 1996.
- Hossler, D. "The Role of Financial Aid in Enrollment Management." In M. Coomes, (ed.), *The Role Student Aid Plays in Enrollment Management*. New Directions for Student Services, no. 89. San Francisco: Jossey-Bass, 2000.
- Hossler, D., Braxton, J., and Coopersmith, G. "Understanding Student College Choice." In J. C. Smart (ed.), *Higher Education: Handbook of Theory and Research*. New York: Agathon Press, 1989.
- Hossler, D., Schmit, J., and Vesper, N. *Going to College: How Social, Economic, and Educational Factors Influence the Decisions Students Make*. Baltimore, Md.: John Hopkins University Press, 1999.
- Jackson, G., and Weathersby, G. "Individual Demand for Higher Education." *Journal of Higher Education*, 1975, 46(6), 623–652.
- Kane, T. "College Attendance by Blacks Since 1970: The Role of College Cost, Family Background and the Returns to Education." *Journal of Political Economy*, 1994, 102(5), 878–911.
- Kohn, M., Manski, C., and Mundel, D. "An Empirical Investigation of Factors Which Influence College-Going Behavior." *Annals of Economics and Social Measurement*, 1976, 5(4), 391–419.
- Lapovsky, L., and Hubbell, L. *Tuition Discounting Continues to Grow*. Washington, D.C.: National Association of College and University Business Officers, 2003.
- Leslie, L., and Brinkman, P. "Student Price Response in Higher Education." *Journal of Higher Education*, 1987, 58, 181–204.
- Maurice, S., and Smithson, C. *Managerial Economics: Applied Microeconomics for Decision Making*. Homewood, Ill.: Irwin, 1985.
- McPherson, M., and Schapiro, M. "Measuring the Effects of Federal Student Aid: An Assessment of Some Methodological and Empirical Problems." Williamstown, Mass.: Williams Project on the Economics of Higher Education, 1989.
- McPherson, M., and Schapiro, M. *The Student Aid Game: Meeting Need and Rewarding Talent in American Higher Education*. Princeton, N.J.: Princeton University Press, 1998.
- Paulsen, M. *College Choice: Understanding Student Enrollment Behavior*. ASHE-ERIC Higher Education Report, no. 90–6. Washington, D.C.: George Washington University, 1990.
- St. John, E. "Price Response in Enrollment Decisions: An Analysis of the High School and Beyond Sophomore Cohort." *Research in Higher Education*, 1990, 31(2), 161–176.
- St. John, E. "Assessing Tuition and Student Aid Strategies: Using Price Response Measures to Simulate Pricing Alternatives." *Research in Higher Education*, 1994, 35(3), 301–334.
- St. John, E., Asker, E., and Hu, S. "The Role of Finances in Student Choice: A Review of Theory and Research." In M. B. Paulsen and J. C. Smart (eds.), *The Finance of Higher Education: Theory, Research, Policy, and Practice*. New York: Agathon Press, 2001.
- Toutkoushian, R. "Do Parental Income and Educational Attainment Affect the Initial Choices of New Hampshire's College-Bound Students?" *Economics of Education Review*, 2001, 20, 245–262.
- Venti, S., and Wise, D. "Test Scores, Educational Opportunity, and Individual Choice." *Journal of Public Economics*, 1982, 18, 35–63.
- Weiler, W. "Using Enrollment Demand Models in Institutional Pricing Decisions." In L. Litten (ed.), *Issues in Pricing Undergraduate Education*. San Francisco: Jossey-Bass, 1984.
- Weiler, W. "Enrollment Demand with Constrained Supply in a Higher Education Institution." *Research in Higher Education*, 1987, 27(1), 51–61.
- Winston, G. "Subsidies, Hierarchy and Peers: The Awkward Economies of Higher Education." *Journal of Economic Perspectives*, 1999, 13(1), 13–36.

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