
The Economic Behavior of Academic Research Libraries: Toward a Theory

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ABSTRACT

THIS ARTICLE EXAMINES THE ECONOMIC BEHAVIOR OF ACADEMIC RESEARCH LIBRARIES. It argues that academic research libraries seek to maximize universities' utility by expanding library collections. The log-linear model that reflects the relationship between library collections and prestige of universities was formulated, tested, and proved to be the best fit of the data. The regression results show that about 40 percent of the variance of the dependent variable can be accounted for by library volume collections and 26 percent can be explained by library serials collections. The findings are consistent with those from a previous study using a different ranking system and sample data and reconfirm that indeed library collections contribute significantly to prestige of universities.

INTRODUCTION

The history of academic libraries in the United States is almost as long as that of academic institutions of higher learning.¹ Academic research libraries play a significant role in supporting teaching and research at universities by acquiring and maintaining library collections and by providing a wide range of library and information services. This study examined the economic behavior of academic research libraries. It argues that academic research library administrators tend to maximize their library utility by expanding the size of library collections. The rationale for seeking to expand library collections can be exemplified by the statement made by a group of academic research library administrators who are associate deans for planning and administrative services, collections, and information access services. Ronald F. Dow, Salvatore Meringolo, and Gloriana St. Clair

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(1995, p. 103) stated that "Library collections have been viewed as the soul of the academic disciplines, the repository of all the research and scholarly effort that has gone before. For that reason the size of the library's collections in each of the disciplines in some way is seen as a reflection of the institution's commitment to learning within an academic discipline. For as a college or university invests in collections, it vests the academic discipline on campus with local value and prestige too. As the library collections support research and study in an area of knowledge, the institution will be able to attract the best scholars and students of that discipline, enhancing faculty reputation, the value of the degree earned by students, and institutional image." This investigation explains why academic research libraries behave the way they do by empirically examining the relationship between the size of collections and prestige of universities. Prestige of universities is, according to the economic theory of universities, believed to be crucial for survival and competitiveness of research universities since it attracts fine scholars, top students, and funding from various sources.

It is important to differentiate academic research libraries from general academic libraries and nonacademic research libraries. Academic research libraries in this article refer to those that support missions and goals of research-oriented universities. There are about 110 of these libraries belonging to the Association of Research Libraries (ARL). ARL has specific requirements and standards for its members in terms of the level of collections, total number of staff, size of budget, and level of technologies used in the libraries. These academic research libraries have a strong emphasis on research collections. There are many more general academic libraries with collections that are mostly used to support teaching and do not have comprehensive research collections and services. There are also nonacademic research libraries, such as the New York Public Library, which have comprehensive research collections but do not share the missions and goals of academic research libraries. These three kinds of libraries have different missions and goals and therefore their economic behaviors may differ. The discussions of this article specifically focus on academic research libraries.

Why Economic Theory of Academic Research Libraries?

Scholars in all disciplines, such as the physical sciences and social sciences, have made great efforts in developing theories of their disciplines. The field of economics deals with how individuals and organizations utilize their limited resources to meet their needs and make better choices to maximize their economic welfare. Economic studies on academic research libraries are important because academic research libraries, like all other organizations, need to make choices and effectively and efficiently use their limited resources to achieve their organizational goals. Economic theory, like many other theories in the physical and behavioral sciences, is "a set of propositions" that have been tested and proved to be universally accepted prin-

ciples that allow us to explain and predict future economic behaviors of individuals and organizations. Economic theory of academic research libraries can help university administrators, library administrators, librarians, and others to better understand the economic behavior of these libraries. It provides a conceptual framework for understanding why libraries behave in certain ways and addresses questions like: What kinds of organizational goals do academic research libraries seek? How do academic research libraries differ from universities and other nonprofit organizations? What are the unique economic characteristics of academic research libraries? How do they maximize their utility and improve their operating efficiencies as compared with other nonprofit organizations?

While there have been studies on some economic aspects of academic research libraries, such as their costs, economic behavior has rarely been examined and no theory governing the economic behavior of academic research libraries has been put forward. This article intends to develop a theoretical framework governing the economic behavior of academic research libraries and to test some of the assumptions using empirical data.

THE RESEARCH LITERATURE

Before the discussion of the theory of economic behavior of academic research libraries, it is important to review the literature on economics of nonprofit organizations and economics of universities—for a number of reasons. First, an academic research library is a unit of a university and shares overall missions and goals of the university. Second, universities are commonly categorized as nonprofit organizations and share some common characteristics of nonprofit organizations. Third, some theoretical works on nonprofit organizations in general and on universities in particular have already been developed and can be used to serve as a basis for further development of the theory of economic behavior of academic research libraries.

Economics of Nonprofit Organization in General: Three Sectors of the Economy

In the United States, there are mainly three sectors in the economy: the for-profit sector, the government sector, and the nonprofit sector. The goal of for-profit enterprises is to make a profit. Profit can be made through producing low-quality goods or providing low-quality services and charging lower-prices or through producing high-quality goods or providing high-quality services and charging higher prices. The private sector is the largest sector in the U.S. economy comprising over 85 percent of GDP (U.S. Census Bureau, 2000, p. 452). Privately owned businesses and corporations that sell stocks to raise capital for their operations belong to this sector.

The public sector has emerged in many countries. One of the reasons for the existence of the public sector, according to the economic theory, is market failure. Market failure exists when private markets are not able to provide certain goods or not able to provide them at the optimal level. The

public sector provides a variety of public goods to meet economic, social, and educational needs of people, which the private sector is not willing or not able to provide. The nonprofit sector has become an important part of economic systems of many countries. It exists because of the failure of both the private sector and the public sector to provide certain goods and services demanded by certain segments of society. A nonprofit organization is a voluntary institution that does not seek to make a profit. U.S. nonprofit institutions are given tax-exempt status by the Internal Revenue Service. Unlike a corporation whose profit can be redistributed to its stock holders in the form of dividends, the surplus (excess of income over expenditures) of a nonprofit must not be redistributed to any members of the organization, but can be used for future operations. Henry Hansmann (1980) classified nonprofit organizations into donative nonprofit organizations and commercial nonprofits. Donative nonprofits receive donations from various individuals and institutions as the source of their income. Commercial nonprofits derive their income from sales and services. According to Hansmann, both forms of nonprofits can be either mutual or entrepreneurial. Donors control mutual nonprofits, whereas customers control entrepreneurial nonprofits. There are various kinds of nonprofit organizations, including hospitals, nursing homes, day-care centers, educational institutions, religious organizations, and various forms of voluntary organizations. Richard E. Quandt has recently pointed out that there exists another kind of nonprofit: charitable foundations which are neither donative nor commercial. He provided examples of the Andrew Mellon Foundation, the Ford Foundation, the MacArthur Foundation, and the Hewlett-Packard Foundation, and argued that these foundations may have at one point received donations but they are not controlled by the original donors. Their income is generated from portfolios.²

The for-profit sector has long been researched by economists and there exists an enormous and well-established body of economic literature on the private sector. Economic studies on the public sector are also abundant. But economists did not pay much attention to the nonprofit sector until the 1970s when more and more nonprofits emerged and became an important sector of the national economy. The lack of understanding of the roles and behaviors of nonprofits and the need for policy guidance prompted many economists as well as scholars in other academic fields to study why they exist and how they perform. In 1977, the Program on Non-Profit Organizations at Yale University was established. Economic researchers were assembled to study theories and practices of nonprofit organizations and to provide policy guidance for government agencies as well as for nonprofits. As a result, hundreds of journal articles, books, and working papers have been published (Brewster, 1986).

Some economic studies on nonprofits were conducted as early as the

1960s, such as Kenneth Arrow's study (1963) on medical care and William J. Baumol and William G. Bowen's study (1966) on performing arts. Serious theoretical inquiries into the roles and the behaviors of nonprofits by economists probably did not start until 1970 when Newhouse published his article entitled "Toward a theory of nonprofit institutions: An economic model of a hospital" (Newhouse, 1970). There is no single universal economic theory explaining the role and behavior of nonprofits. But rather, there are a number of theories and models developed to explain the existence and goals of nonprofits, such as the public goods theory, contract failure theory, subsidy theory, consumer control theory, entrepreneur theory, and competition theory (Rose-Ackerman, 1986; Hansmann, 1987). This is due to the fact that there exists a wide variety of nonprofit organizations in terms of control, such as mutual versus entrepreneur and donative versus commercial (as Hansmann classified) and in terms of the different nature of these nonprofits, such as performing arts, day-care centers, hospitals, educational institutions, religious organizations, and so on. While these theories and models are not completely consistent with one another, they are mostly interrelated.

The mainstream theory of nonprofits was proposed by Burton Weisbrod (1986). He believed that the existence of voluntary nonprofits is the result of government failure in providing certain public goods for a certain segment of the population. Public goods provided by the public sector through the political process are not adequate to satisfy the demand of all voting citizens. Citizens demanding higher levels of public goods and services would have to make altruistic donations to voluntary organizations that are willing to provide such goods and services. As Susan Rose-Ackerman (1986) pointed out, Weisbrod's theoretical assumption suggests that a Pareto superior situation exists in which both the public and the nonprofit sectors provide higher levels of public goods and services than the public sector alone does—everyone is at least as well off as in a situation without the nonprofit sector. Weisbrod's theory was criticized by Jeffery Weiss and Henry Hansmann. Weiss (1986) argued that "... if the levels of voluntary and governmental provision are determined simultaneously, then a high demander may be worse off with voluntary provision than without it." Hansmann (1987) also pointed out that "The services provided by many nonprofits do not seem to be public goods but rather appear to be private ones. This is true especially of commercial nonprofits." Despite the criticisms, Weisbrod's theory remains the major contribution to explaining the existence of voluntary nonprofit organizations.

Another main theory that attempts to explain the existence of nonprofit organizations is the contract failure theory that originated from the study of day-care centers by Nelson and Krashinsky (1973). According to this theory, parents may have difficulties in judging the quality of services pro-

vided by for-profit firms and worry that they may provide low-quality services to maximize profit. Parents tend to trust nonprofit firms that have no incentive to maximize profit given their nondistributive nature. People buy products and services of nonprofits because they believe that nonprofit organizations are trustworthy. Later, this theory was broadly applied to other kinds of nonprofit organizations (Hansmann, 1987, p. 30).

While economists try to explain why nonprofits exist in our economy by developing theories, they also attempt to describe economic behaviors of nonprofits. Joseph Newhouse, one of the early pioneers studying economic behavior of nonprofit organizations, particularly hospitals, believed that the goal of nonprofits is to reach the highest possible utility by maximizing quality and quantity of their services and that the seeking profit criterion as used by for-profit organizations cannot be applied to nonprofit organizations. Newhouse (1970) argued that "... the prestige of the institution is prominent among other variables," and "... a pursuit of status ... , a desire to serve society, ... a desire to show professional excellence or technical virtuosity by stressing quality" are some of the nonmonetary goals nonprofit organizations seek. Although Newhouse stressed the prestige or quality side of services, he recognized that nonprofits have budget constraints and it is impossible to maximize both quality and quantity of their services with these constraints. He observed that nonprofit organizations may prefer a higher level of quality to a higher level of quantity if they have to choose between quality and quantity of services. This behavior obviously differs from that of many profit-maximizing firms, which would tend to make profit by producing a larger number of lower-quality goods and services. Once a nonprofit organization achieves a given level of quality, it will maximize quantity of its goods and services to reach the highest utility.

Economics of Education

Institutions of higher education are considered as nonprofit organizations. Economists did not pay much attention to economics of education until 1961 when Theodore Schultz (1961) published the seminal article *Investment in Human Capital*. He eventually won the Nobel prize in economics for his contribution to economics of education and agriculture. Since then, much of the research on economics of education has been dominated by the human capital theory. Studies on investment in education and training and rate of returns on investment in higher education, secondary education, and primary education have become prevalent. Such studies have been conducted not only by economists but also by scholars in education in the attempt to improve productivity of workers as well as to achieve economic growth and development in less developed countries. Economic analyses of educational institutions, such as higher education, were also scarce before the 1970s. James Maynard (1971), Donald Verry, and Bledyn Davies (1976) were among the earliest to study economics of institu-

tions of higher education. Maynard studied economies of scale of higher education in the United States and Verry and Davies examined costs and outputs of universities in the UK.

Two important theoretical works on economic behavior of colleges and universities were produced by Estelle James (1978) and David A. Garvin (1980). James formulated a model for postsecondary educational institutions in the United States and argued that it could also be applied to some types of nonprofit organizations in general, such as health and the arts. She maintained that universities produce multiproducts: undergraduates, graduates, and research, and engage in "cross-subsidization" activities, and argued that undergraduate education is a "profitable activity" and graduate education and research is a "consumption activity" since revenues generated from undergraduate tuitions are larger than those from graduate education because undergraduate classes are bigger than graduate classes. The revenues gained from undergraduate education could be used to support graduate education and research since the latter is considered as a more preferred activity.

Garvin specifically studied the economic behavior of universities. He argued that universities are utility-maximizing nonprofit organizations and that prestige is the most important part of a universities' utility function. According to his assumption, administrators of universities prefer to enhance prestige of their institutions by recruiting top students and well-known scholars. Garvin also observed that faculty members also want to increase their personal prestige and prestige of their academic programs to attract research grants and enhance their own market value. Quality and quantity of students are also considered as important factors of the utility function of universities. Garvin believed that to improve prestige, universities need to offer advanced academic degrees, such as doctoral degrees. Both quantity and quality of research activities are crucial to enhance prestige of departments.

Economic Studies of Academic Libraries

Academic research libraries play an important role in accomplishing the missions and goals of universities. They select, acquire, organize, and maintain collections (books, journals, databases, and other library materials) and provide various library and information services to support teaching and research at universities. Empirical economic studies of libraries were conducted notably by a few economists and library science scholars with in-depth training in quantitative research methodologies. Most of these studies focused on scale economies of public libraries and academic libraries.

William J. Baumol et al. (1969) studied costs of various types of libraries. They looked at scale economies of libraries and found that economies of scale existed for large-sized public libraries but pointed out that savings were small. Baumol and Marcus published a book on economics of academ-

ic libraries in 1973. This book looked at growth rates of college and university libraries, costs of acquisitions, costs of library operations, and cost trends, and explained the role of economic analysis in library budget preparation. They separated public and private college libraries, grouped them by various enrollment levels, and specifically regressed a number of dependent variables such as total library staff, volumes added, cost of volumes added, and total library operating costs on a number of explanatory variables such as volumes held, expenditures per student, and college enrollment level. The results of these linear regression analyses were statistically significant. The authors argued that such regression models can be used for long-term planning and budget preparation. For example, a library's operating budget can be determined by volumes needed to be added and professional librarians needed to be hired in the future. This study was one of the earliest economic analyses applied to academic libraries.

Stanley W. Black (1969), Haynes Goddard (1973), Kathleen Foley Feldstein (1976), Michael D. Cooper (1979), Larry DeBoer (1992), and Christopher J. Hammond (1999) studied scale economies of public libraries. Black; DeBoer; and Hammond also looked at input substitution elasticities. Robert M. Hayes (1979) examined the optimal use of labor and capital in providing services. A very few researchers studied academic libraries. Kantor (1981) specifically formulated a total cost function for scientific and technical libraries with total cost as the dependent variable and in-house material use, circulation, and reference queries as the independent variables. Cooper (1983) studied two-year and four-year private and public academic libraries. Some researchers used the Cobb-Douglas production function. Others used cost functions. Findings were mixed. Some found increasing returns to scale and others found decreasing or constant returns to scale. Robert M. Hayes and Harold Borko (1983) examined the relationship between the size of academic research libraries' collections and faculty research productivity as measured by faculty publications. They found a significant contribution of library collections to faculty research productivity.

Cost-benefit analyses and cost modeling have also been used in various library settings. For example, Bruce Kingma (e.g., 1998) applied cost-benefit analyses to issues on access, ownership, and interlibrary loan service. Charles McClure et al. (1995) developed Internet cost models for public libraries.

In recent years, economists began to apply data envelopment analysis (DEA) to academic (Chen, 1997) and public libraries (Vitaliano, 1998; Sharma, et al., 1999). DEA is a methodology for measuring the efficiency of programs and organizations. It is widely used in business and industry. There are a number of advantages to using this methodology: it can be used to deal with multiple inputs and outputs and can be used as a standard criterion to compare peer institutions. Because of the highly quantitative

nature of DEA, it has not been utilized as a management tool by either librarians or library science researchers.

THIS STUDY

Economic studies on libraries are intended to improve efficiency of libraries and for long-term planning related to library materials, staff, and services. Empirical studies on economic behavior of libraries, particularly academic research libraries, in terms of what kinds of goals and objectives they pursue, how they maximize their utility, and why they behave the way they do, seem to be ignored. This article argues that academic research libraries, like universities, are also utility-maximizing institutions and that academic research libraries seek prestige by expanding and maintaining their volume and serial collections to support teaching, research, and learning at their universities. This article further explains why academic research libraries seek to expand their collections by specifically examining the relationship between the size of print collections of academic research libraries and prestige of universities. As part of a university, an academic research library is under the control of the university in a number of ways. First, the missions and goals of the academic research library must be consistent with the overall missions and goals of the university. Second, the academic research library receives funds from the university for its operations. The library's budget is part of the overall budget of the university. Third, the library is administratively controlled by the university. Its administrators, such as its director, are recruited and appointed by the university. In other words, the academic research library is not a complete, independent unit in terms of finance, administration, and the overall mission. However, the utility function of the academic research libraries is different from that of academic departments because of the role of academic research libraries in supporting the teaching and research at universities and the nature of services they provide. Academic departments maximize their utility by increasing the prestige of their programs. To do so, they recruit well-known scholars and enroll top students. A famous faculty member is likely to bring in more research grants and attract more top students. But the utility function of academic research libraries differs from that of academic departments. Academic research libraries seek prestige by maintaining and expanding the size of their collections. With comprehensive collections, an academic research library can adequately support the research and teaching of faculties. Given limited budgets, academic research libraries have to make a choice that can best contribute to the library's utility and overall university's utility. It is argued that their priority is collections. A larger size of an academic research library collection leads to a higher level of prestige for its university.

Quality and quantity of research contributes significantly to the prestige of universities. Academic research libraries play a significant role in

supporting research and facilitating scholarly communication. The current research is often built on previous research and previous research findings are normally documented in formal publications such as books, journal articles, working papers, and conference proceedings. Libraries select, purchase, and organize these materials in such a way that they can be readily accessed and retrieved. Scholars rely on books and articles for their research. They learn new ideas, discover new findings related to their research, and communicate with their peers formally through reading books and articles. To a certain extent, the effectiveness of research often depends on the size of the collections of the library. An instant access to an article needed by a scholar certainly will help to expedite the research process. Difficulties in getting information that a scholar needs can slow down or even stop the research. A widely used phrase in the library research literature to describe this situation is "Access delayed is access denied." An adequate collection is crucial for effective research. Although Internet technology, such as the use of Ariel and a Web site to send and receive articles, has emerged and is used to speed up the process of borrowing items located outside the library, locally owned items or items that can be accessed locally are still more readily accessible than items that can be obtained from other libraries via interlibrary loan or membership of a library consortium.

Academic libraries have been collecting print materials for hundreds of years. While print collections have been an important indicator of capacity to support teaching and research at universities, in recent years Internet technology has been applied to many areas of scholarly information production, organization, and delivery, and it has had a great impact on library services (Liu, 2001a). Many academic libraries have started developing digital collections and include electronic journals and full-text databases in their collections. Many journals are published in electronic format. Many print journals have been scanned into electronic format and can be retrieved from Web sites. Electronic journals provided by commercial vendors have become widely available for libraries to use. Examples are Science Direct, EBSCO, and JSTOR. Despite the emergence of electronic collections, print materials are still major sources of information for a number of reasons. First, most full-text journals are limited to recent years of publication. Some vendors, such as JSTOR, provide back issues of full-text journals which go back to the turn of the twentieth century. But the journal coverage is limited. Second, books are still in print format. Although some attempts have been made to digitize books, they are limited to those books whose copyrights have expired. Digitizing books in libraries is a huge task. A large research library can hold many millions of volumes and to scan them into computer format can take years. Also copyright is an important issue. To digitize books requires copyright permissions from publishers and probably hundreds of publishers must be dealt with before such a process can begin. The main assets of academic research libraries are still their print collections.

Collections can be in print and electronic form. Print volumes held, and number of serial subscriptions, are used in this study as measures of library collections simply because libraries are still in the process of moving from print libraries to digital libraries. The fact is that books in libraries are still in print form. Journals in libraries that cover over a ten- to fifty-year time span are still in print form. In the future when all library collections are stored in digital format, the measures will be the ones that reflect library digital collections.

Measurements

It was hypothesized that the size of library collections contributes to prestige of universities. The dependent variable was prestige of universities. The measurement for prestige was the U.S. News and World Report (USNWR) rankings of universities (*U.S. News 2000 College Ranking Online*). "Academic reputation" was used for prestige ranking in this article. The ranking data of the top 100 universities were gathered from the list provided by the USNWR based on their "academic reputation scores."³ According to the USNWR, academic reputation scores were calculated based on a survey of the presidents, provosts, and deans of admissions at institutions.⁴ Eighty-two of these one hundred universities and their libraries were eventually used in the regression because the other eighteen universities were not ARL members and did not have the library volume and serial data consistent with those of the ARL. A previous study (Liu, 2001b) looked at the relationship between prestige of academic programs and library collections using a linear model and the data compiled by the National Research Council. The ranking by the National Research Council was based on the amount of research, number of publications, and funding received by academic programs.

The independent variables were the total number of volumes held and total number of serials held by academic research libraries. Volumes held by libraries as defined by the ARL were used as a measure because they are the most expensive and important assets of libraries, which have been built over a long period of time and are crucial for research and teaching. The total number of serials was used as another measure because serials, like books, are indispensable for research, teaching, and learning. Researchers rely on journals for obtaining current research findings, exchanging ideas, communicating with their peers, and presenting their research results. The levels of volume and serials holdings reflect the commitment academic research libraries make to support their universities. The proposed models intended to include the most important assets of academic research libraries and capture their influences on prestige of universities. Data on the total number of volumes held and total number of serials held by academic research libraries was collected from the 1998–1999 data file compiled by the Association of Research Libraries (1998–1999).

The initial correlation analysis showed that volume and serials variables

are highly correlated. As a result, either one may be used as a measure of library collections although the volume variable with a higher R square accounts for more of the variance in prestige. But additional efforts were made to identify the unique influence from each independent variable. The regression models with both volumes and serials as independent variables were tested. In testing the models, it was found that multicollinearity existed between the two independent variables. Multicollinearity refers to situations in which two independent variables in a regression model are so highly correlated that their effects on the dependent variable cannot be separated. The coefficient of volumes was statistically significant but the coefficient of serials was not. In the attempt to overcome this problem, a model using the volume-to-serial ratio as well as serials as independent variables was tested. The results showed that the model was statistically significant and was able to identify the unique influence from each independent variable, but overall results were inconclusive. Another solution to deal with the multicollinearity problem is to "drop" one of the independent variables and test it separately. Various forms of models, such as the quadratic functions were also tested. The linear models in general and log linear models in particular turned out to be the best fit of the data. The following are the final regression models:

The Models

$$1. \ln P_i = \ln \beta_o + \beta_I \ln V_i + \varepsilon_i$$

$$2. \ln P_i = \ln \beta_o + \beta_I \ln S_i + \varepsilon_i$$

Where

i indexes individual institutions ($i = 1, \dots, N$),

N is the total number of observations,

P is the prestige indicator or rankings for universities,

V is the total number of volumes held,

S is the total number of serials held,

β_o is the intercept,

β_I is the coefficient,

ε is the statistical noise or the error term.

It is specified that:

$\beta_I < 0$ because the relationship between the direction of rankings and the sizes of holdings is inverse due to the fact that 1 is the highest rank in the ranking system, yet numerically it is the smallest, $\beta_o > 0$ because only a positive sign of the intercept makes sense.

The Results

Table 1 shows that both the coefficients of V and S are statistically significant at high confidence levels. The negative signs of both independent

variables conform with the theoretical assumption, that is, an increase in total number of library volumes and an increase in total number of library serials can boost prestige of universities. The *R*squares show that about 40 percent of the variance of *P* can be accounted for by *V* in Model 1 and about 26 percent can be explained by *S* in Model 2. These findings are similar to the ones in a previous study using data compiled by the National Research Council and seem to reconfirm the underlying theoretical assumption.

Table 1. Regression Results. The Dependent Variable is *P*.

Variable	Parameter Estimate	Standard Error	<i>t</i> Value	Sig. Level	<i>R</i> ²
<i>Model 1</i>					
Intercept	23.44663	2.75253	8.52	.0001	0.3996
<i>V</i>	-1.33646	0.18316	-7.30	.0001	
<i>Model 2</i>					
Intercept	13.20329	1.87883	7.03	.0001	0.2555
<i>S</i>	-0.96389	0.18398	-5.24	.0001	
Cases = 82					

The findings of this empirical experiment have shown that volume and serials collections make a significant contribution to prestige of universities, particularly when considering their supporting role in universities' research and teaching. This article has argued that while academic research libraries are part of nonprofit organizations and universities since they share many characteristics of nonprofit organizations, are under the jurisdiction of universities, and share the missions and goals of universities, they seem to have their own utility function. They seek to expand and maintain their collections because the larger size of library collections leads to higher prestige of universities. Whereas, academic programs seek prestige by recruiting top scholars to increase research and publication activities. Given budget constraints, academic research libraries must make choices and prioritize their spending. This article argues that the priority is given to collections. This study seems to show that library administrators in these research-oriented universities under investigation understand how to maximize universities' utility by maximizing library collections. Academic research libraries have been able to maintain the level of volume and serials collections to such an extent that its significant relationship with prestige can be visibly and quantitatively identified.

The findings of this investigation may have policy implications for university and college library administrators. Academic research libraries may help to improve their institutional prestige by increasing the size of their library collections. However, it does not mean that a university can become a well-known institution of higher learning instantly after its library

purchases millions of volumes overnight. The library's contribution to institutional prestige is mostly through providing research support for their faculty members in academic departments. Researchers rely on books and journals to obtain research information, communicate with their peers, and report their research results. Instant access to research literature can expedite the research process and makes scholars more productive.

SUMMARY AND CONCLUSION

This investigation intended to observe economic behavior of academic research libraries and to find out how they contribute to overall university utility by maximizing their own utility. This article argues that academic research libraries seek to maximize their utility by expanding the size of their library collections. Furthermore it has provided the reason why they do so. The hypothesis that library collections contribute to overall prestige of universities was tested using a natural log linear model. The results show that there is a fairly strong association between library volume and serial collections and prestige of universities. Library volume and serials collections accounted for a significant amount of contribution to prestige of universities, particularly when considering their supporting role in research and teaching at universities. These findings are consistent with those of the previous study using a different ranking system and sample data. It seems that this investigation has reconfirmed the proposed theoretical assumption that library collections contribute to prestige of universities as well as their academic programs.

It must be pointed out that while, in this study, print collections were used as library collection measures, there should not be much difference between print volume and serial collections and electronic volume and serial collections in terms of the measurement of library collections. If, in the future, libraries will be able to digitize all their print collections, then electronic collections can be used as library collection measures. However, some researchers have expressed the concerns that when books and journals are all stored in computers, scholars would lose browsing opportunities. Lack of browsing opportunities may lead to decreases in research productivity.

Economic theories on a variety of nonprofits, including higher educational institutions, have been established since 1970. There have been economic studies on libraries in general and academic research libraries in particular by a few economists and library science scholars. But there has been lack of theoretical works. It is hoped that this study can contribute to a better understanding of the economic behavior of academic research libraries and encourage more research efforts in the future.

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NOTES

1. John Budd recorded in his book, *The Academic Library: Its Purposes and Its Operation* published by Libraries Unlimited Inc. in 1988, that the Harvard College Library, the first academic library, was founded in 1638 when the library received a few hundred books from John Harvard, two years after Harvard College was established.
2. Richard E. Quandt commented on the earlier draft of this article and pointed out the existence of charitable foundations.
3. *Online U.S. News and World Report. 2000 College Ranking*. The data were retrieved on October 27, 1999. The top 100 universities from the top tier and second tier were sorted and ranked based on their academic reputation scores. <http://www.usnews.com/usnews/edu/college/corank.htm>.
4. *Online U.S. News and World Report 2001*. Definitions of Ranking Criteria. Academic Reputation. (<http://www.usnews.com/usnews/edu/college/rankings/about/weight.htm>).

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